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Professionals and Agents:

Three Essays on Governance in California Medical Groups

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Management

by

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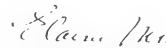

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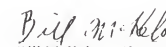

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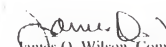

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To Jonathan.

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PRESENTATIONS

Elms, H. (1998). Strategy and structure: Low-cost, differentiation, and risk-sharing in managed care organizations. Conference paper, Strategic Management Society, Orlando, FL.

Elms, H. (1998). Professional organizations: Information, agency, and governance. Conference Paper, Academy of Management, San Diego, CA.

Elms, H., and Berman, S. (1998). Common agency: New models for stakeholder theory?. Conference Paper, International Association for Business and Society, Kona, Hawaii.

Elms, H., Berman, S., and Wicks, A. (1998). Ethics and incentives: An application, evaluation, and development of stakeholder theory in the health care industry. Conference Paper, Western Academy of Management, Portland, OR.

Elms, H. and Berman, S. (1997). Stakeholder agency theory: A critical example and extension. Conference Paper, International Association for Business and Society, Destin, FL.

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ABSTRACT OF THE DISSERTATION

Professionals and Agents:

Three Essays on Governance in California Medical Groups

by

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Doctor of Philosophy in Management

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Professor James Q. Wilson, Co-chair

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This dissertation's three empirical papers critically examine principal-agent theory by testing several sets of agency-based hypotheses in the context of California medical groups. The dissertation hypothesizes that monitoring as a basis for incentive provision will be positively associated with incentive provision, while monitoring as an alternative to incentive provision will be negatively related to incentive provision. The dissertation also hypothesizes that greater difficulty in information transfer leads to more combined decision management (initiation and implementation) and decision control (ratification and monitoring) in individual agents, and that the combination of decision management and decision control in a few agents leads to ownership that is restricted to

those agents. Finally, the dissertation proposes a positive relationship between organizational risk and risk-sharing arrangements, compares that hypothesis to previous empirical results, and generates a proposed relationship between organizational size and risk-sharing arrangements. California medical groups provide a particularly appealing arena in which to study the hypothesized relationships as these organizations utilize management techniques which make distinguishing between monitoring as a basis for incentive provision and as an alternative to incentive provision possible and which enable the separation of decision management from decision control. Finally, as professional organizations--generally considered the classic example of the trade-off between risk-sharing and incentives--these organizations offer a useful arena in which to study risk and risk-sharing, especially given a great deal of variation in the level of risk each of them faces and in their responses to that risk. Results suggest that these organizations substitute between incentive provision and monitoring as an alternative to incentive provision, but do not provide evidence that these organizations treat incentive provision and monitoring as a basis for incentive provision as complements. Results also suggest that the incentive effects of organizational size, rather than the relative costs of separating decision management and control, are associated with the ownership and decision management and control arrangements utilized. Results offer no evidence in favor of a relationship between organizational risk and risk-sharing, and instead suggest the importance of organizational size and several other characteristics in explaining the use of risk-sharing arrangements.

CHAPTER 1: INTRODUCTION

While organization theorists attest to the ubiquity of agency relationships (Arrow, 1991; Demsetz, 1995; Tosi, Katz & Gomez-Mejia, 1997), empirical examinations of these relationships remain limited. An agency relationship arises any time one individual, the principal, delegates to another, the agent, the authority to take actions on the principal's behalf (Jensen & Meckling, 1976). The majority of relevant empirical research focuses on the pay-for-performance sensitivity of CEO compensation arrangements in large, publicly-traded corporations (Gomez-Mejia, Tosi & Hinkin, 1987; Tosi & Gomez-Mejia, 1989 & 1994; Jensen & Murphy, 1990), the monitoring ability of boards of directors in these organizations (Wade, O'Reilly & Chandratat, 1990), and on the effectiveness of the market for corporate control (Jensen & Ruback, 1982; Davis & Stout, 1992).[1] The latter two emphases reflect a general preoccupation with external control or monitoring mechanisms rather than internal ones. Williamson (1964) suggests that this emphasis is misplaced, given the greater ability of internal mechanisms over external mechanisms to shrink managerial discretion opportunities in the face of weak competition in product and capital markets. External monitoring mechanisms (including the market for corporate control, the managerial labor market or reputational markets, boards of directors, and large shareholders) suffer from their reliance on inferences drawn from observed firm performance, a notoriously shallow indicator in imperfectly competitive markets.

[1] The choice of setting follows that of Berle and Means' original (1932) empirical examination of the implications of agency relationships--the separation of ownership and control. Williamson notes, however, that the corporations addressed by Berle and Means were not the same type of organization addressed in more recent research, as the multi-divisional form only became popular only after the 1930s.

The provision of health care offers a situation replete with agency relationships (Dranove & White, 1990; Salmon, White & Feinglass, 1990; Arrow, 1991; Gaynor, 1997), and one in which external controls experience particular difficulty given imperfections in product, capital, control, and labor markets (Arrow, 1991; Gaynor, 1997). Examining agency relationships in the health care arena offers an opportunity to move inside the organization, to focus on decision-makers other than CEOs, and to examine internal control mechanisms in greater detail. This dissertation examines several subsets of agency theory's hypotheses about the internal organization of health care provision and internal organization more generally. These hypotheses have not yet been well addressed empirically in either health care or in other industries, and the investigation here suggests the need for their further theoretical development.

The second chapter examines the relationship between incentives and monitors. While a number of mechanisms are utilized to govern organizations, previous research tends to examine these mechanisms independently, rather than analyzing the relationships between them. Agency theory identifies two types of governance mechanisms, incentives and monitors, but because the theory does not adequately define these alternatives, the relationship between them remains unclear. I distinguish between four types of incentives and two types of monitoring. Making this distinction enables an understanding of why monitoring is both a complement and a substitute for incentive provision. Previous studies, none of which make the distinction between monitoring types, simply assume they are either substitutes or complements.

The third chapter addresses the relationship between the difficulty of transferring information, the locus of decision management (initiation and implementation) and decision control (ratification and monitoring), and ownership. Agency theorists emphasize that the importance of specific information in professional organizations results in a special class of agency problems and thus in unique organizational characteristics. Given the difficulties associated with the transfer of specific information about particular clients, agency theorists hypothesize that these organizations combine decision management (initiation and implementation) and decision control (ratification and monitoring) in individual agents and deal with the resulting class of agency problems through restrictions on residual claims.

The fourth chapter examines the relationship between risk, risk-sharing, and organizational size. While theorists recognize the tradeoff between risk-sharing and the provision of incentives as a key organizational dilemma, the determinants of risk-sharing arrangements remain empirically unclear. Much of the empirical literature focuses on professional organizations, given these organizations' role as risk-sharing devices. I propose a relationship between organizational risk and risk-sharing arrangements, compare it to several previous empirical results, and generate a proposed relationship between organizational size and risk-sharing arrangements.

Professional organizations

I examine the relationships between incentives and monitors, information, decision-making and ownership, and organizational risk, risk-sharing, and organizational size in the context of a particular type of professional organization: medical groups.

Physicians increasingly work in these organizations (Kletke, Emmons & Gillis, 1996). The percent of physicians practicing in medical groups (as opposed to solo practice or partnerships of two physicians) has increased by 361% since 1965 (only 26.5% of physicians were still in solo practice in 1995), and the average size of medical groups is increasing (Emmons & Kletke, *forthcoming;* American Medical Association, 1997). Physicians join medical groups for a number of reasons: satisfactory income, frequent freedom from night and weekend calls, vacations with pay, relief from administrative problems, paper work, and organizing retirement plans, greater access to equipment and ready consultation, emotional support, and regular stimuli to improve quality and performance (Boan, 1966). Disadvantages center around the independence relinquished by individual physicians as they become subject to policy decisions adopted by the organization as a whole (or by its most dominant members) (Boan, 1966). Additionally, physicians practicing in medical groups no longer approximate the classic entrepreneur of neoclassical economic theory--owning and operating their own practices (Fama, 1980). Rather, in addition to being agents of patients, they become agents of the owners of the medical practice. Small group practices often make all physicians owners, but the same is not true for large practices (see Chapter 3), and even if physicians are partial owners, they bear only a portion of the risk associated with their decisions. The consequent agency problem makes medical groups an excellent arena in which to test the agency-based hypotheses of this dissertation.

Given managed care's heavy penetration into the state, California medical groups provide a particularly appealing arena in which to study the hypothesized

relationships. California medical groups offer a useful context in which to study the relationship between incentives and monitors because they utilize management techniques which make distinguishing between monitoring as a basis for incentive provision and as an alternative to incentive provision possible. These organizations are also amenable to studying the determinants of combined decision management and decision control and the effects of this combination on residual claim arrangements because the management techniques these groups use additionally make separating decision management from decision control possible. Finally, as professional organizations—generally considered the classic example of the trade-off between risk-sharing and incentives--these organizations offer a useful arena in which to study risk and risk-sharing, particularly given a great deal of variation in the level of risk each of them faces and in the ways they respond to that risk.

Management and Policy Implications

"The present crisis of unfulfilled health needs in the United States is essentially a crisis of organization. We have enormous capability for advancing health. We have large and growing resources for health care. We still lack systems and procedures for harnessing this capability and applying these resources where the needs are. Somehow we need to meet the organizational crisis on organizational terms.....Whenever health care is better organized, by whatever mechanisms, the public will gain." While perhaps the reference to large and growing resources gives it away, these words become particularly provocative when the reader realizes that they were voiced by William H. Stewart, M.D., Surgeon General of the United States, in *1967* (Public Health Service,

1967: 6). Stewart offered this statement in an introduction to the first national conference on the promotion of medical group practice, sponsored by the Public Health Service. In 1918, Michael M. Davis had uttered similar words to the American Public Health Association, suggesting that what was required to provide better quality medicine at lower cost was *organization:* "This means not organization of equipment, but also organization of skill." (Davis, 1919: 359). While the group practice of medicine has changed a great deal since 1967, Surgeon General Stewart's words (1967: 6) remain appealing: "...there is a need for imaginative experimental new forms and formats of group practice. We cannot afford to be frozen in a few tried and true patterns. We need to reach out for new incentives and new financial and organizational mechanisms." This dissertation provides evidence for both managers and policy-makers on the organizational governance mechanisms in use by modern medical groups.

Previous empirical evidence suggests that individual governance mechanisms matter to measures of medical group performance: Parker (1979) found that physician ownership was positively related to several measures of primary care performance in multispecialty group practice. In a sample of pediatricians, Hickson, Altmeier & Perrin (1987) found that fee-for-service compensation was associated with more patient visits and care more in line with pediatric guidelines, relative to salary compensation. Hillman, Pauly, & Kerstein (1989) found both salary- and capitation-based compensation to be significantly and negatively associated with the rate of hospitalization, while the use of withholding and penalties for deficits in hospitalization funds were similarly related to the number of outpatient primary care visits per enrollee per year. Gaynor & Pauly

(1990) and Gaynor and Gertler (1996) demonstrated that physicians paid on an quantity-contingent basis provided a higher quantity of care. Rosenberg et al. (1995) found that utilization review reduced the number of diagnostic and surgical procedures. These studies remain limited, however, to the effects of individual governance mechanisms, and do not address relationships between multiple mechanisms. This dissertation examines the latter, providing a basis for studies of the performance implications of combinations, rather than individual, mechanisms.

CHAPTER 2: INCENTIVES AND MONITORS: SUBSTITUTE AND COMPLEMENT AMONG ALTERNATIVE GOVERNANCE MECHANISMS

While a number of mechanisms are utilized to govern organizations, organizational, strategic, and economic research tends to focus on the determinants and effects of individual governance mechanisms, implicitly assuming that these mechanisms operate independently (Rediker & Seth, 1995). Agency theory, a theory of organizational governance, suggests instead that organizational governance arrangements be approached as configurations, in which the strength of each mechanism depends on the strength of the others (Spence & Zeckhauser, 1971; Stiglitz, 1975; Demsetz, 1983, 1995; Levinthal, 1988). Organization theorists have expressed both a general interest in configurational analysis (Miller, 1986 & 1996; Meyer, Tsui & Hinings, 1993), and a specific one in governance configurations (Walsh & Seward, 1990). Very recent empirical research in the organizational, strategic, and financial economic literature begins to take an explicitly agency-theoretic, configurational approach to governance arrangements (Beatty & Zajac, 1994; Rediker & Seth, 1995; Agrawal & Knoeber, 1996). This research, however, remains limited by an inadequate theoretical conceptualization of the governance mechanisms it examines, and therefore by the relationships specified between mechanisms. I extend the study of governance configurations by clarifying the components of these configurations and by reconsidering the expected relationship between individual mechanisms.

Detailing the relationship between organizational governance mechanisms and describing organizational governance configurations will reveal new information on the arrangements organizations use to resolve conflict, and might help to resolve key debates in the governance literature concerning the sensitivity of executive pay to organizational

performance (Gomez-Mejia, Tosi & Hinkin, 1987; Tosi & Gomez-Mejia, 1989; Jensen & Murphy, 1990) and the effectiveness of the market for corporate control (Jensen & Ruback, 1983; Davis & Stout, 1992). Given that agency theory suggests the necessity of utilizing a variety of mechanisms simultaneously to align the interests of principals and agents and thus mitigate the agency problem, analyses evaluating the degree of alignment associated with isolated, individual governance mechanisms remain incomplete. To describe an organization's governance arrangements as ineffective, given that the CEO's compensation appears to be relatively unrelated to the performance of the organization, for example, ignores the possibility that the board of directors additionally keeps a tight hold on the CEO's reins, restricting his/her ability to make decisions inconsistent with those of the organization's principals. The results of statistical analyses which fail to consider interrelations among control mechanisms may also be spurious (Agrawal & Knoeber, 1996). Outlining optimal governance configurations will additionally provide a basis for systematically analyzing strategy theorists' suggestions that governance arrangements play a key role in organizational performance--enabling organizations to attenuate losses and leverage resources and capabilities (Chandler 1962, 1990 & 1992; Armour & Teece, 1978; Teece & Pisano, 1994; Montgomery, 1996).

BACKGROUND

The Relationship between Incentives and Monitors

Previous agency theoretic descriptions of the relationship between incentives and monitors remain unclear. As a theory of organizational governance, agency theory approaches the firm as a nexus of contracts between principals (residual claimants) and

agents (decision-makers) (Jensen & Meckling, 1976; Fama, 1980). Assumed differences between the interests of principals and agents make the separation of ownership and control, or more correctly, the separation of risk-bearing and decision-making, the central problem of organizational governance (Fama & Jensen, 1983a). For agency theorists, the purpose of organizational governance structures is to efficiently align agents' goals with those of principals (Jensen & Meckling, 1976).

Jensen & Meckling's (1976) original theoretical contribution offers principals two options for limiting agents' divergences from residual claimants' interests: "..establishing appropriate incentives for the agent and...incurring monitoring costs designed to limit the aberrant activities of the agent." (p. 308). Similarly, Jensen (1983) later distinguishes between 1) the reward and punishment system and 2) the performance measurement and evaluation system. The relationship between incentives and monitors remains vague, however, and the distinction between these apparently alternative governance mechanisms lapses elsewhere. In the same paper cited above, Jensen & Meckling (1976) later include incentives as monitors: "[monitoring] includes more than just measuring or observing the behavior of the agent. It includes efforts on the part of the principal to 'control' the behavior of the agent through budget restrictions, compensation policies, operating rules, etc.". (p. 308).[1] Other discussions of governance arrangements also neglect to clearly differentiate between incentive-based mechanisms and monitoring-based ones. Alchian & Demsetz (1972) distinguish at one point between metering input productivity (monitoring)

[1] In a relevant critique of agency theory, Sharma (1997) also notes the broad use of the term "monitoring" by Jensen & Meckling (1976).

and metering rewards (incentives) (p. 120), but then include observing input behavior (monitoring), measuring output performance (monitoring), and apportioning rewards (incentives), under the rubric of monitoring (1972:124-125). Tosi & Gomez-Mejia (1989, 1994) lump measures of pay practices (incentives) and the potential for manipulation of pay practices by the CEO (addressed by monitoring) measures into a single monitoring scale, justifying this composite scale through reference to Jensen's (1983) remiss distinction between incentives and monitoring. Murdoch (1991) includes incentive contracts (incentives), along with the board of directors (monitors), and markets for corporate control and managerial labor (incentives *and* monitors) as alternate monitoring devices.

Baker, Jensen and Murphy (1988) argue that theoretical explanations of both incentives and monitors remain incomplete, and that "A thorough understanding of internal incentives is critical to developing a viable theory of the firm, since they largely determine how individuals behave in organizations." (p. 593).[2] Tosi, Katz, & Gomez-Mejia (1997) suggest that "the theoretical work in agency theory unnecessarily oversimplifies the complexity of the contract and skirts some serious problems about fundamental characteristics of its common elements, monitoring and incentive alignment..." (p. 585). Incentives' and monitors' differential costs and effects make distinguishing more carefully between and specifying the relationship among them

[2] Baker, Jensen and Murphy (1988) include both incentives (pay-for-performance) and monitors (performance evaluation) in their discussion of "internal incentives". Eisenhardt (1985: 135) describes performance evaluation as "the cybernetic process of monitoring and rewarding performance."

important to an understanding of individual and organizational behavior and performance (Zajac & Westphal, 1994; Tosi, Katz, & Gomez-Mejia, 1997).

Several recent publications test the hypothesis that incentives and monitoring constitute *substitute* governance mechanisms (Beatty & Zajac, 1994; Zajac & Westphal, 1994; Rediker & Seth, 1995; Agrawal & Knoeber, 1996). Substitution, however, implies an either/or strategy--in attempting to economize on agency costs, organizations might use either incentives or monitors. Substitutes are goods, or in this case, governance mechanisms, that tend to be consumed or utilized instead of each other.[3] Several organization theorists remind us, however, that at least at some minimal level, monitors remain necessary even when organizations provide rich incentive packages (Arrow, 1964; Nalbanthian, 1987; Demsetz, 1995). Demsetz crystallizes this position in a recent critique of agency theory and neo-Marxist thought. "The notion that incentive wages obviate the need for monitoring is wrong." (Demsetz, 1995: 39).

Theoretical approaches that suggest organizations' need for both incentives *and* monitors imply that incentives reward or punish certain behaviors or performance, while monitors instead collect information on input behavior or performance. Monitors provide the primary source of information on which rewards remain necessarily based (Arrow, 1964; Nalbanthian, 1987). Without monitors, organizations lack an appropriate basis for providing rewards.

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[3] Mathematically, this relationship is expressed as $\Delta x1/\Delta p2>0$. Watching a video at home, for example, is a substitute for going out to the cinema. As the relative price of the cinema increases, consumers increase their consumption of videos. In the context of governance mechanisms, the price of implementation should be included in p2.

> The economic organization through which input owners cooperate will make better use of their comparative advantage to the extent that it facilitates the payment of rewards in accord with productivity. If rewards were random, and without regard to productive efficiency, no incentive to productive effort would be provided by the organization; and if rewards were negatively correlated with productivity, the organization would be subject to sabotage. (Alchian & Demsetz, 1972: 120. Also see Ouchi, 1979.)

Similarly, Milgrom & Roberts (1992) argue that when organizations use performance-contingent compensation, it pays to measure performance well.[4] "[S]etting intense incentives and measuring performance carefully are complementary activities.....; undertaking either activity tends to make the other more profitable." (p. 227). Complementarity between incentives and monitors defines monitoring as the collection of information on which incentives (rewards and punishments) are based (see Figure 2.1 for a depiction of the distinction between types of monitors and incentives). Hence Hypothesis 1:

Hypothesis 1: The use of monitoring as a basis for incentive provision will be positively associated with the provision of incentives.

When monitoring is the collection of information on which incentives are based, incentives and monitors are complements--goods or mechanisms that tend to be consumed together.[5] Subject to budget constraints, when the cost of one falls, the use of both increases.[6] Graphically, the relationship between incentives and monitors slopes upward--as the use of incentives rises, so does the use of monitors. Empirically, given the costs of both mechanisms, organizations limit the use of both.

Tosi, Katz, and Gomez-Mejia (1997) fail to find support for the complementarity

[4] This argument is a combination of the incentive intensity and monitoring intensity principles.
[5] Milk and cookies are a familiar example.

hypothesis (Hypothesis 1). Hypothesis 1's definition of monitoring, however, makes no allowance for organizations which collect information but do not use it explicitly for reward or punishment. Complementarity approaches make the implicit assumption that organizations which collect information use it for reward or punishment. Organization theorists, however, have long suspected that the simple collection of information, even without an explicit tie to reward or punishment, is enough to change the behavior of organizational participants:

> Social scientists are only too familiar with the fact that the process of collecting information on people's activities influences these activities. The presence of an observer in a work group affects the behavior he wants to study, and the repeated interviews in a panel study of political attitudes increase the political interest of respondents. In this bureaucracy [an employment agency] the collection of data on operations, such as the number of interviews each official held, also influenced the interviewer's conduct. (Blau, 1955:34)

Blau (1955) argues that data collection *directly* affects behavior, rather than indirectly through the data's link to incentives (in his example, corrective action). Gouldner (1954: 87) observes that just the presence of the new supervisor, Peele, was enough to change his subordinates' behavior. Blau & Scott (1963: 178) contend that "The [state employment] agency developed performance records as an indirect means of control—to provide the supervisor with information which would serve as a basis for the evaluation and guidance of workers. But once introduced, *the records themselves became a direct mechanism of control.*" (my italics). Deception in behavioral experiments operates on the same principal: measurement changes behavior, regardless of explicit reward or punishment, so that experimenters do not inform participants of the study's focus (see Milgram, 1964).

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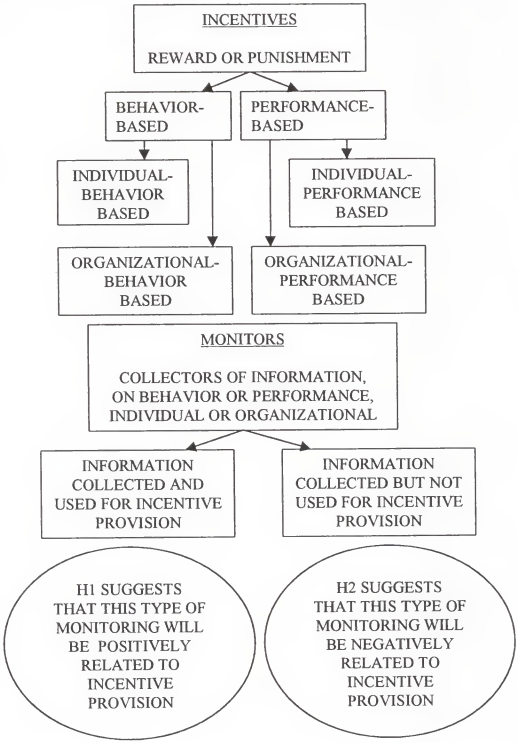
[6] Mathematically, this relationship is expressed as $\Delta x1/\Delta p2<0$. Again, the price of implementation should be included in p2.

FIGURE 2.1: TYPES OF INCENTIVES AND MONITORS AND THE RELATIONSHIP BETWEEN THEM


INCENTIVES
REWARD OR PUNISHMENT
BEHAVIOR-BASED
PERFORMANCE-BASED
INDIVIDUAL-BEHAVIOR BASED
INDIVIDUAL-PERFORMANCE BASED
ORGANIZATIONAL-BEHAVIOR BASED
ORGANIZATIONAL-PERFORMANCE BASED
MONITORS
COLLECTORS OF INFORMATION, ON BEHAVIOR OR PERFORMANCE, INDIVIDUAL OR ORGANIZATIONAL
INFORMATION COLLECTED AND USED FOR INCENTIVE PROVISION
INFORMATION COLLECTED BUT NOT USED FOR INCENTIVE PROVISION
H1 SUGGESTS THAT THIS TYPE OF MONITORING WILL BE POSITIVELY RELATED TO INCENTIVE PROVISION
H2 SUGGESTS THAT THIS TYPE OF MONITORING WILL BE NEGATIVELY RELATED TO INCENTIVE PROVISION

Incentives reward or punish particular behaviors or performance. The recognition that the simple collection of information on agent's behaviors or performance--even without a tie to reward or punishment—may alternatively encourage or discourage certain behaviors or performance suggests that perhaps incentives and some monitors are indeed substitutes.

Hypothesis 2: The use of monitoring as an alternative to incentive provision will be negatively associated with the provision of incentives.

When monitoring is not explicitly tied to incentives, monitoring and incentives act as substitutes. Given limited resources, when the cost of one rises, the use of the other increases. Graphically, the relationship between incentives and monitors slopes downward--as the use of incentives increases, the use of monitors decreases. Obviously, these two mechanisms remain imperfect substitutes. Large incentives may be based on relatively small amounts of information (Arrow, 1964). Tosi, Katz, & Gomez-Mejia (1997) ask "How much monitoring is equal to how much incentive alignment?" (p. 597). Effective substitution between incentives and monitoring should bias governance configurations in favor of incentives, since decision-makers prefer monied compensation to monies spent on monitoring and on in-kind amenities (Demsetz, 1995). Incentives remain the first-best solution to the agency problem, and the optimal level of monitoring is based on the magnitude of the incentive gap between principal and agent (Jensen & Meckling, 1976).

The Relationship Between Incentives: Individual and Organizational, Behavior and Performance Bases

Organization theorists suggest that incentives can be provided on the basis of either behavior or performance (Ouchi, 1977, 1979 & 1980; Eisenhardt, 1985 & 1988). [7]

> If we understand the technology (that is, the means-ends relationships involved in the basic production or service activities) perfectly, as is the case in a tin-can plant, then we can achieve control simply by having someone watch the behavior of the employees and the workings of the machines: if all behaviors and processes conform to our desired transformation steps, then we know with certainty that proper tin cans are coming out the other end, even without looking. (Ouchi, 1979: 843)

If the technology remains unclear, however, and the requirements of successful production or service deny identification (observing a CEO's or physician's activities gives very little insight into the level of effort or thoughtful consideration expended, and thus into the likelihood of a successful outcome), organizations must look instead at performance as a relatively precise basis for reward (Ouchi, 1977, 1979 & 1980). Performance is a surrogate measure of behavior: good performance suggests appropriate behavior, while poor performance suggests inappropriate behavior (Eisenhardt, 1985). If the technology is clear and there also exists an unambiguous measure of output, organizations choose the measure of least cost, while if both the technology and measure of output are unclear, they rely on careful employee selection and rituals which reward those who display the underlying attitudes and values believed likely to lead to organizational success (Ouchi, 1977, 1979 & 1980).

Behavior and performance may be measured either at the individual level or at the organizational level (or at some subset of the organizational level, e.g., by department,

[7] Performance is also referred to as output or outcomes.

division, or region) (Gaynor & Gertler, 1996; Lang & Gordon, 1996). While Eisenhardt (1989) argues that information systems (monitoring) will be positively related to behavior-based incentives, she neglects not only to distinguish between the two types of monitoring identified in Hypotheses 1 & 2, but also to differentiate between individual and organizational levels. I distinguish between these two levels and in examining the relationship between incentives and monitors, I examine the relationship between individual-performance monitors and individual-performance-contingent incentives. Alternatively, the relationship between organizational-performance monitors and organizational-performance-contingent incentives, the relationship between individual-behavior monitors and individual-behavior-contingent incentives, or the relationship between organizational-behavior monitors and organizational-behavior-contingent incentives might be examined. A valid test of the relationship between incentives and monitors requires consistency across levels.

Although agency theorists suggest that governance mechanisms should be considered jointly, or as a configuration (Spence & Zeckhauser, 1971; Stiglitz, 1975; Demsetz, 1983, 1995; Levinthal, 1988), empirical research remains limited. The recent studies alluded to above (Singh & Harianto, 1989; Murdoch, 1991; Betty & Zajac, 1994; Zajac & Westphal, 1994; Rediker & Seth, 1995; Agrawal & Knoeber, 1996; Tosi, Katz & Gomez-Mejia, 1997) have only begun to add momentum to a trickle of earlier research on the relationship between governance mechanisms (Stigler & Friedland, 1983; Demsetz & Lehn, 1985). This earlier research only implicitly examines trade-offs between governance mechanisms, treating some mechanisms as determinants of others. Stigler & Friedland

(1983) examine the effects of ownership on the level of management compensation (including bonuses, although it is unclear from their text whether these bonuses are individual- or organizational- performance-contingent compensation). Demsetz & Lehn (1985) analyze the relationship between regulation (an external control mechanism) and ownership.

The more recent research explicitly examines trade-offs between governance mechanisms (Singh & Harianto, 1989; Murdoch, 1991; Beatty & Zajac, 1994; Zajac & Westphal, 1994; Rediker & Seth, 1995; Agrawal & Knoeber, 1996; Tosi, Katz & Gomez-Mejia, 1997). In addition to addressing the relationship between incentives and monitors, this research begins to examine the relationship between different monitoring mechanisms (Rediker & Seth, 1995) and between different incentive mechanisms. Rediker & Seth (1995) explore substitution between the governance mechanisms of monitoring by outside directors and monitoring by large outside shareholders or mutual monitoring by inside directors.[8] Beatty & Zajac (1994) examine the relationship between managerial equity stakes and stock options, while Zajac & Westphal (1994) analyze that between managerial equity stakes and long-term incentive compensation.

Although these authors address governance mechanisms jointly, however, they do not distinguish between monitoring as a basis for incentive provision, and monitoring as an

[8] Note that these studies' monitoring measures are limited to those reflecting the composition of the board of directors (Singh & Harianto, 1989; Beatty & Zajac, 1994; Rediker & Seth, 1995), the presence of large, non-board member, shareholders (Beatty & Zajac, 1994; Rediker & Seth, 1995), whether the CEO, Chairman (Beatty & Zajac, 1994; Rediker & Seth, 1995), and President (Rediker & Seth, 1995) positions are held by the same individual, and the use of venture capital backing (Beatty & Zajac, 1994). Murdoch (1991) does not measure monitoring directly, she infers the difficulty of monitoring by gauging noise in firm performance measures.

alternative to incentive provision. Each of these previous studies proposes strict substitution or complementarity between these mechanisms. This study distinguishes between the two forms of monitoring and examines the relationship of each type of monitoring to incentive provision.

METHOD

Medical group population

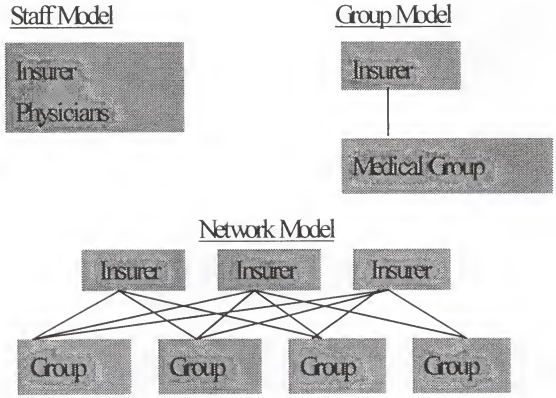
I examine substitute and complement between alternative forms of monitoring and incentives in the context of insurer-contracted medical groups. These organizations offer an excellent arena in which to test hypotheses about alternative forms of monitoring. Insurer-contracted medical groups utilize several management techniques which make distinguishing between monitoring as a basis for incentive provision and as an alternative to incentive provision possible.

Examining the relationship between incentives and monitors in medical groups has policy as well as management implications. As the providers of health care for indemnity insurers and increasingly of managed care services (providing care to 69% of those enrolled in HMOs in the United States--see Hoechst Marion Roussel, 1997), medical groups remain relatively unexplained organizational forms (Kerr et al., 1995; Gold et al., 1995 a&b).[9] These organizations provide care under contract with multiple insurers, in

[9] Until recently, staff- and group- model health maintenance organizations (HMOs) provided the vast majority of managed care services. In these HMOs, physicians (referred to as MDs in the tables) are either employees of the HMO (in the case of the staff-model HMO), or are employed by a large medical group that contracts exclusively with a single HMO (in the case of the group-model HMO). Physicians employed by these two types of organizations care only for patients enrolled in the single HMO for which the physician works or with which the physician's medical group contracts. See Figure 2.2 for a comparison of HMO forms.

which each insurer contracts with multiple medical groups to provide care for the insurer's enrollees, and each medical group in turn contracts with multiple insurers (Kerr et al., 1995; Gold et al., 1995 a&b; Robinson & Casalino, 1995 & 1996).

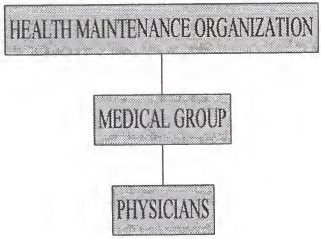
FIGURE 2.2: STAFF, GROUP, AND NETWORK MODEL INSURERS
(Boxes denote organizational boundaries, lines indicate contracting relationships)



Hillman et al. (1992: 137) refer to these arrangements as "three-tiered", in which the insurer constitutes the first tier, the medical group comprises the second tier, and member physicians make up the third tier (see Figure 2.3). Contracts between insurers and medical groups are characterized by either fee-for-service compensation or capitation. Fee-for-

service compensation provides the medical group with a payment *for every service* they provide to the contracting insurer's enrollees. Under capitation, the medical group instead receives a payment *for every enrollee*, every month, from which the medical group is meant to cover the cost of all services provided to that enrollee. The medical group pools these capitated payments, and essentially pay for all care from a central fund. Thus, while the total costs of care for a particular patient(s) may exceed the sum of the payments provided by the insurer for that patient's (patients') care, those costs are paid out of the insurer's payments for patients whose total care costs are less than those payments. The medical group retains the difference between the cost of the services they provide and the capitated payments, but they also accept financial risk for any costs of enrollees' care that exceed the sum of these payments.

FIGURE 2.3: THE THREE-TIERED CONTRACTUAL ARRANGEMENT (Hillman et al. 1992)



Although these medical groups contract with insurers to provide care for the insurers' enrollees, control over their own internal governance mechanisms remains with

the groups (Hillman, Welch, & Pauly, 1992; Kerr et al., 1995). Groups retain control over the incentives they provide to their physicians, and how they design monitoring mechanisms internal to the group (although contracting insurers usually require some basic monitoring mechanisms without detailing their structure) (Hillman et al., 1992; Kerr et al., 1995). Recent empirical examinations of medical groups, however, remain descriptive and have yet to systematically assess these organizations' consistency with theories of organizational governance (Kralewski et al., 1996; Trauner & Chesnut, 1996; Conrad et al., 1996).[10] Beyond knowing that the development of governance arrangements remains within the medical groups' purview, researchers know relatively little about these mechanisms:

> The middle level of a managed care organization in three-tiered arrangements [in which the insurer constitutes the top tier, the medical group comprises the middle tier, and member physicians make up the bottom tier] is an important feature that is not well understood...few studies detail the organizational form of [this] middle level, its functions and how it modifies....the directness of the relationship between managed care plans and physicians. (Gold et al., 1995a: 321; see also Figure 2.3).

Meanwhile, concern continues to grow about the rise of capitated contracts and the use of innovative incentive and monitoring arrangements by medical groups (Starr, 1982; Salmon, White & Feinglass, 1990; Woolhandler & Himmelstein, 1995; also see reactions to Woolhandler & Himmelstein, 1996). Understanding the governance structures of medical groups would significantly improve our ability to evaluate the implications of these structures for health care delivery. Many health services researchers recognize agency theory's relevance to the organization of health care, but systematic tests

[10] Also see Hillman, Welch & Pauly, 1992; Gaynor, 1997; Kerr et al., 1995; Gold et al., 1995 a&b; and Robinson & Casalino, 1995 & 1996.

of the theory's empirical implications in the health care sector remain limited (Dranove & White, 1987; Salmon, White & Feinglass, 1990; Pontes, 1995; Gaynor & Gertler, 1996; Gaynor, 1997).

The sample

Detailed data on the governance mechanisms utilized by these medical groups come from a recent survey-based study of medical groups conducted by the author.[11] A sample of 1,000 California medical groups was selected from a population of 1,954 medical groups in California using a stratified random sampling method. The population was identified by combining directories of California medical group practices from the American Medical Association[12], the American Group Practice Association (now part of the American Medical Group Association), and the Medical Group Management Association[13], and by combing trade publications for names of existing medical groups. Faculty practice and group HMO medical groups (i.e., Kaiser Permanente Medical Group) were not included in the sample given their differences from the network-model-insurer contracted medical groups under focus. Given the skewed distribution of the population, large groups (those over the population's median size of 7) were targeted to insure that

[11] Tosi, Katz, & Gomez-Mejia (1997) suggest the use of traditional organizational science methodologies, including both laboratory studies and survey research, as a potentially more fruitful avenue for understanding the relationship between incentives and monitors complement than the archival economic and demographic data generally used.

[12] The American Medical Association's group directory is produced from their annual survey of individual practitioners, in which they ask those respondents who are medical group members for the name and address of the medical group with which they practice. Their survey is not limited to American Medical Association members.

[13] The American Medical Group Association and the Medical Group Management Association are the two predominant medical group associations in the country. Both associations' directories are limited to their members.

some responses would come from large practices (in which agency problems were expected to be greater).

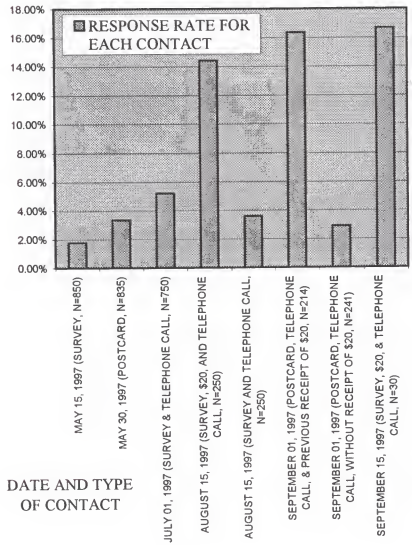
The survey

The 25-page survey was based on an agency theoretic model of the incentive and monitoring mechanisms specific to medical groups. These mechanisms were identified by reviewing the literature on physician compensation, medical group ownership structure, and the physician monitoring techniques included under the general rubric of utilization management. Additionally, as part of this and several other related studies, the author conducted 120 exploratory, semi-structured interviews with medical directors, other key medical group administrators, and physicians in 17 managed care settings in 4 states: California (11 organizations), Texas (3 organizations), Minnesota (1 organization), and Maryland (2 organizations). A pilot test of the survey instrument was administered to 15 medical directors in California, 3 of whom agreed to serve on the project's advisory panel and provide additional comment. Finally, executives in 3 medical group management associations: the Medical Group Management Association (MGMA), the Independent Practice Assocation of America (IPAA) and the National Independent Practice Association Coalition (NIPAC) reviewed the survey instrument and provided input on its construction. The MGMA additionally provided a letter of support to be enclosed with each survey, while IPAA offered an endorsement mentioned in the survey's cover letter and an advertisement in their member newsletter encouraging participation. The cover letter also included references to the project's advisory panel and support from the VA/UCLA/RAND Center for the Study of Healthcare Provider Behavior and the

UCLA Center for Health Services Management. The letter was signed by the physician directors of these two Centers, and by the author.

The survey was administered in several phases. Initially, all 1,000 organizations in the sample received the cover letter, MGMA letter, the survey, a brochure describing the study, and a self-addressed, postage-paid envelope. The survey packet was addressed to either the organization's medical director (these organizations' key physician executive) or, if no medical director existed, the organization's practice administrator (these organizations' key lay executive). These individuals were identified using the directories and other publications employed to identify the population (or by a telephone call if no other information was available). Two weeks later, non-respondents received a reminder post-card. Throughout the following month, non-respondents were telephoned randomly, and a randomly selected 750 of the initial 1,000 organizations received a second set of all survey materials with a revised cover letter at the end of that month. Randomly selected non-respondents continued to be telephoned throughout the next month, and a randomly selected 500 received another complete set of survey materials 6 weeks later. A randomly selected 250 of these 500 also received a $20 bill and a cover letter noting the gift's inclusion, but also asserting no obligation on the part of potential respondents. An additional postcard was sent to all non-respondents within this 500 organization subset 2 weeks later, and each organization received a telephone call. Two weeks later, a randomly selected 30 of the 250 organizations (within the 500 organization subset) which had not previously received the $20 gift received it, a complete survey packet, and a telephone call.

FIGURE 2.4: RESPONSE RATE FOR EACH CONTACT


RESPONSE RATE FOR EACH CONTACT
18.00%
16.00%
14.00%
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
MAY 15, 1997 (SURVEY, N=850)
MAY 30, 1997 (POSTCARD, N=835)
JULY 01, 1997 (SURVEY & TELEPHONE CALL, N=750)
AUGUST 15, 1997 (SURVEY, $20, AND TELEPHONE CALL, N=250)
AUGUST 15, 1997 (SURVEY AND TELEPHONE CALL, N=250)
SEPTEMBER 01, 1997 (POSTCARD, TELEPHONE CALL, & PREVIOUS RECEIPT OF $20, N=214)
SEPTEMBER 01, 1997 (POSTCARD, TELEPHONE CALL, WITHOUT RECEIPT OF $20, N=241)
SEPTEMBER 15, 1997 (SURVEY, $20, & TELEPHONE CALL, N=30)
DATE AND TYPE OF CONTACT

Of the original sample of 1,000 medical groups, 150 organizations were deleted from the sample population through random telephone follow-ups and directed telephone follow-ups of returned-to-sender survey packets. These organizations had either ceased to exist altogether or had been acquired by another organization already included in the sample. 175 organizations responded to the survey, representing a response rate of 21%. Response rates for each contact are included in Figure 2.4 (Figure 2.4's Ns are reported minus the 150 organizations that were eventually deleted). Response rates were demonstrably higher among those who received the $20 gift, but because these organizations were randomly selected, any related bias should be relatively inconsequential.

Representativeness

Responding organizations appear to be representative of the population in terms of size, specialty, and geographical location. Respondents indicated the size of their organization as the number of physician members and contractors included in the organization.[14] The AMA directory, AGPA directory, MGMA directory, and several trade publications provided information on the size of 1,081 of the organizations in the population (N=1,954). The median size of responding organizations was 10 physicians—

[14] Member physicians were defined for respondents as employees and/or partners whose primary or only employment was with the organization. Contractor physicians were defined as solo-practitioners, partners, and/or employees of another organization with whom the responding organization contracted to provide care to the responding organization's patients or enrollees.

not significantly different from the population (on which there was available data) median of 7 physicians ($p > .10$).[15]

Respondents also indicated whether theirs was a primary care, single specialty, or multi-specialty organization. 55% of the responding groups identified themselves as single specialty, 21% identified themselves as primary care groups, and 24% identified themselves as multi-specialty groups. Hence the mode of organization among respondents was single-specialty. I coded the medical specialty of each group in the population (N=1,954) utilizing information included in the AMA directory, AGPA directory, and MGMA directory, and in cases where this information was missing, using clues provided by the name of the medical group (Arlington Radiology Medical Group, for example, was coded as a single-specialty organization). 55% of the groups in the population were identified as single-specialty organizations, while 14% were identified as primary care organizations and 31% as multi-specialty organizations. Similar to respondents, the population's mode of organization was single-specialty. The proportion of responses from single-specialty organizations matched the proportion of the population that was single-specialty (55%), but primary care groups appear to be mildly over-represented among respondents (21% of the respondents were primary care while 14% of the population was primary care), while multi-specialty groups appear to be mildly under-represented (24% of the respondents were multi-specialty while 31% of the population was multi-specialty) (see Table 2.1).

[15] Given the left-skewed distribution of size, the median is more descriptive than the mean.

TABLE 2.1: COMPARISON OF RESPONDENTS TO POPULATION BY MEDICAL SPECIALTY				
	Single-Specialty	Primary Care	Multi-Specialty	Total
Respondents	55%	21%	24%	100%
Population	55%	14%	31%	100%

These apparent differences may, however, be the result of inaccuracies in the population statistics. The AMA directory distinguished only between single-specialty and multi-specialty organizations, coding primary care organizations as multi-specialty organizations. I attempted to correct for the lack of identification of primary care groups and over-identification of multi-specialty groups by recoding family practice groups, general practice groups, internal medicine groups, *general* pediatric groups (pediatric subspecialty groups, including pediatric neurology, were coded as single specialty groups) and those organizations with "primary care" included in the title of the group as primary care groups, since each of these types of practices often provide primarily primary care services. The population statistics still probably underestimate the proportion of primary care groups and overestimate the proportion of multispecialty groups, however, suggesting that the relatively small differences between respondents and the population may not even be as large as those indicated by the available statistics.

Finally, using postal service area 3-digit zipcodes, I compared respondents' zip-codes with those of organizations in the population. The proportion of respondents coming from each postal service area appears to be similar to the proportion of the population of organizations in each area (see Table 2.2).

TABLE 2.2: COMPARISON OF RESPONDENTS TO POPULATION BY 3-DIGIT ZIPCODES					
Postal Service Area	3-Digit Zipcodes	Number of Respondents	Percent of Respondents	Number in Population	Percent of Population
Los Angeles	900-918, 926-928	63	36%	800	41%
San Diego	919-921	19	11%	161	8%
San Bernardino	922-925	9	5%	90	5%
Oxnard	930-931	5	3%	50	3%
Bakersfield	932-933	6	3%	39	2%
Santa Barbara	934	2	1%	22	1%
Mojave	935	2	1%	18	1%
Fresno	936-938	6	3%	49	3%
Salinas	939	2	1%	25	1%
San Francisco	940-944	14	8%	193	10%
Oakland	945-948	16	9%	186	10%
North Bay	949,954	4	2%	46	2%
San Jose	950-951	8	5%	76	4%
Stockton	952-953	7	4%	68	3%
Eureka	955	2	1%	15	1%
Sacramento	956-958	5	3%	81	4%
Marysville	959	4	2%	25	1%
Redding	960-961	1	1%	10	1%
Total		175	100%	1954	100%

Independent variables

Monitoring as an alternative to incentive provision

I present descriptive statistics for all measures in Table 2.3 and a correlation matrix in Table 2.4. I measure the two types of individual-performance monitoring with several indices of survey responses on retrospective profiling. Employed under the general rubric of utilization management programs--control systems which assess the provision of care, curtail the provision of inappropriate care, and ensure that services are provided in a cost

TABLE 2.3: DESCRIPTIVE STATISTICS (Means, Medians or Percentages*, Standard Deviations [S.D.], Minimums [Min.], and Maximums [Max.])

Variable:	Mean	Median or %*	S.D.	Min.	Max.
Dependent variable:					
Incentives					
INDIVIDUAL-PERFORMANCE-CONTINGENT COMPENSATION	76.69	100.00	37.28	0.00	100.00
As 0/1/2:					
No individual-performance-contingent compensation		13%			
Some individual-performance-contingent compensation		36%			
All individual-performance-contingent compensation		51%			
Independent variables:					
Monitors					
As incentive basis:					
BASIS FOR FINANCIAL REWARDS/PENALTIES	3.25	0.00	19.99	0.00	200.00
As 0/1 (some use as basis=1)		6%			
As incentive alternative:					
PROFILING	4.09	0.00	5.24	0.00	17.00
As 0/1 (some profiling=1)		44%			
Control variables (for ease/difficulty of monitoring):					
ORGANIZATION SIZE (# OF MDs)	106.65	9.50	339.90	3.00	3200.00
LN(# OF MDs)	2.80	2.30	1.73	1.10	9.50
SPECIALTY (SINGLE=0, MULTI=1)		24%			
FAMILIARITY (AVERAGE TENURE OF MDs)	11.11	10.00	5.60	2.00	28.00
RESIDUAL CLAIMANTS (NOT-FOR-PROFIT=0, FOR=1)		93%			
ORGANIZATIONAL FORM (MG=0, IPA=1)		14%			
ORGANIZATIONAL AGE (# OF YEARS)	18.46	16.00	13.68	1.00	73.00
LN (ORGANIZATIONAL AGE)	2.57	2.77	0.95	0.00	4.29

* Percentages are reported for 0/1 indicator variables

TABLE 2.4: CORRELATION MATRIX FOR ALL VARIABLES

Variable:	2	3	4	5	6	7	8	9
1. Individual-performance-contingent-compensation	-0.14	-0.14	0.04	0.08	-0.11	0.10	-0.02	-0.02
2. Monitoring as incentive basis		0.21	-0.12	-0.05	0.10	-0.17	-0.01	0.13
3. Monitoring as incentive alternative			-0.01	0.16	-0.13	-0.06	0.07	-0.15
4. Organization size (Ln[# of MDs])				0.07	-0.15	-0.02	0.10	-0.18
5. Specialty (Multispecialty=1)					-0.29	-.03	0.38	-0.19
6. Familiarity (Average MD tenure)						0.14	-0.25	0.35
7. Residual claimants (For-profit=1)							0.06	0.11
8. Organizational form (IPA=1)								-0.21
9. Ln(Organizational age)								-

effective manner—retrospective profiles measure physicians' utilization patterns, counting his/her use of various services. Utilization is only an intermediate outcome in the relationship between physician and patient (the final outcome being health, continued illness, or death), but it provides an immediate indicator of the physician's efforts to treat patients, bring the group more revenues, or practice efficiently. I measure monitoring as an alternative to incentive provision as an index of 5 survey responses regarding the use of profiling (Cronbach's alpha=.87). Groups indicated whether they profiled physicians' utilization rates for ambulatory specialty referrals, ambulatory tests and procedures, pharmaceuticals, hospitalization rates, and whether they reviewed changes in utilization over time. Groups also indicated how regularly (monthly, quarterly, semi-annually, annually, or never) they collected this information. The monitoring as an alternative to

incentive provision index would be equal to 20 for a group that reported profiling physicians on all of these indicators monthly (the most stringent response possible). This index would be equal to zero for a group that reported never profiling physicians on any of these indicators (the least stringent response possible). In reality, this index ranged from 0 to 17, and averaged 4 (annual review of four of the five utilization areas, usually not pharmaceutical utilization).

Monitoring as a basis for incentive provision

In addition to simply being collected (as measured by the monitoring as an alternative to incentive provision index above), profiled information can additionally be utilized as a basis for calculating the part of the physician's compensation based on his/her individual output or performance. I measured monitoring as a basis for incentive provision with the use of profiled information as a basis for calculating the part of the physician's compensation based on his/her individual performance. This measure is an index of two survey responses, one asking how often (0 to 100% of the time) profiled information was used as a basis for financial rewards, and the other asking how often profiled information was used as a basis for financial penalties (Cronbach's alpha= .71). This measure ranged from 0 to 200, but because its distribution is heavily skewed to the left (the vast majority of organizations did not report utilizing profiled information in the calculation of individual-performance-contingent compensation), I also analyzed the data utilizing a dichotomous version of this variable: 0 meaning that the organization did not utilize profiled information in the calculation of individual-performance-contingent

compensation, and 1 meaning that they did to some positive extent. The results described below were robust to both measures.

Dependent variable

Incentive Measure

I measure the dependent variable, the level of individual-performance-contingent incentives, as the percentage of physicians' compensation that is based on individual measures of performance. Groups reported physicians' compensation as a combination of salary, capitated payments, discounted fee-for service without withhold, discounted fee-for-service with withhold, full fee-for-service, full fee-for-service with withhold, individual-performance-based-bonus, organizational-performance-based-bonus, individual physician's withhold returns, pooled withhold and other risk pool returns, returns to ownership, non-cash benefits, equal share of pool, and individual-productivity-based share of pool.[16] Salary, capitated payments, discounted fee-for-service and full-fee-for-service without withhold, individual-performance-based bonus, individual physician's withhold returns, non-cash benefit, and individual-productivity-based share of pool are compensation arrangements based only on the individual physician's performance, and were thus included in the individual-performance-contingent compensation measure. Discounted and full fee-for-service *with* withhold[17], organizational-performance-based-

[16] Lowes, 1997 provides a relevant discussion of pooling arrangements.

[17] Under withholding arrangements, a portion of the physicians' payment for services is generally withheld by the group until the end of the year, and then passed on to the physician or retained by the group depending on whether or not there is a deficit in the funds the group has allocated to pay for specialty referrals and inpatient care (see Gold, Nelson, Lake, Hurley, & Berenson, 1995 for variations.). If withhold were reported as pooled individually and thus returned only on the basis of the individual physician's output, they were included in the individual-performance-contingent compensation measure.

bonus, pooled withhold and other risk pool returns, returns to ownership, and equal share of pool all depend on organizational performance and were thus included in an organizational-performance-contingent compensation measure. The percentage of organizational-performance-contingent compensation is equal to 100% minus individual-performance-contingent compensation and vice-versa. The distributions of both compensation variables are highly skewed towards either end, given a great deal of variation in the combination of individual-performance-contingent and organizational-performance-contingent compensation used by organizations which based pay on a mixture of the two. To address this departure from a normal distribution, I created a trichotomous categorical variable indicating whether the organization tended to pay its physicians wholly on the basis of individual performance, on the basis of both individual and organizational performance, or not on the basis of individual performance (and hence only on the basis of organizational performance).

Control variables

I also utilize several additional explanatory variables that agency theory suggests might influence the relationship between incentives and monitors. Greater difficulty in monitoring individual performance should be positively related to the use of individual-performance-contingent compensation given the greater relative costs of monitoring. I measure monitoring difficulty with organizational size, traditional group or independent practice association (IPA) organizational form, and group "scope" (single specialty or multispecialty) (cf. Kralewski, Pitt & Shatin, 1985). As the number of physicians, their contact with each other, and the diversity of their professional training, interests, and the

services they offer increases, so does the difficulty of monitoring individual physicians' performance.

I measure organizational size as the number of physicians in the organization. The size of these organizations ranged from 3 physicians to 3,200 physicians, and the distribution is highly skewed to the left, making the median of 10 physicians more descriptive than the mean of 107. An physician organization reporting 13,410 physicians was left out of the analysis as an outlier, and a natural log transformation of this variable was used to normalize its distribution.

I also control for organizational form (traditional group practice versus IPA), since these different structural arrangements might be expected to be associated with different degrees of monitoring difficulty (Kralewski, Pitt & Shatin, 1985).[18] Traditional group practices, in which physicians share business and clinical facilities, records and personnel and often practice together at one site, offer greater opportunities for each group physician to monitor other group physicians. IPAs restrict such opportunities because although individual physicians or traditional group practices join an administrative body that negotiates the provision of their professional services to patients enrolled in managed care plans, individual physicians or traditional group practices maintain and see patients in their own, individual private offices. IPA physicians are not in contact with, and thus have little opportunity to monitor other physicians who are also members of their IPA, unless they are members of the same traditional group practice.

I measure organization scope as a dichotomous variable indicating whether the medical group included physicians from a single specialty or multiple specialties. In single specialty groups, all physicians have similar training and knowledge, and can share information about patients and monitor each other more easily than can physicians in multi-specialty groups, in which physicians come from a range of specialties and thus have different training, knowledge, and experience. Single specialty organizations included, for example, cardiology groups, (in which all physicians were cardiologists), urology groups (in which all physicians were urologists) and primary care groups (in which all physicians were primary care physicians). Seventy-six percent of the physician organizations examined here were single specialty organizations, while twenty-four percent were multispecialty organizations. As indicators of increased monitoring difficulty, organization size, traditional group versus IPA organization (IPA=1) and organization scope (multispecialty=1) should be positively related to individual-performance-contingent compensation.

Conversely, ease of monitoring should be negatively related to the use of individual-performance-contingent compensation. The average tenure of physicians should thus be negatively related to the use of individual-performance-contingent compensation: physicians with longer histories of working together, and thus greater familiarity with each other's practice styles, can more easily monitor one another. Given the propensity of residual claimants to act as monitors, I address the existence of residual

[18] cf. Wholey, Christianson, & Sanchez, 1992 who similarly distinguish between group- and IPA-model HMOs, suggesting that physicians in group HMOs have more and stronger social and instrumental

claimants through an indicator for for-profit organization. For-profit organization should be negatively related to individual-performance-contingent compensation.

Finally, I also control for group age, given the potentially greater costs of governance structure change in older groups. Older medical groups are more likely than younger medical groups to have begun as small partnerships in which physicians received organizational-performance-contingent compensation and were not subject to monitoring in the form of profiling. Moving towards an organizational structure in which physicians are subjected to individual-performance-contingent compensation and profiling might involve significantly greater costs than starting out with these structures. Group age should be negatively related to individual-performance-contingent compensation. The natural log transformation of this variable was used to normalize its skewed distribution.

Model and estimation method

Given the categorical nature of the dependent variable, individual-performance-contingent compensation, and the categorical and continuous nature of the independent variables, I examine the hypothesized relationships between individual performance-contingent compensation and the two types of monitoring through a multinomial logistic estimation of the following regression equation: [19]

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attachments to the HMO than do physicians in IPA HMOs.

[19] Multinomial logistic regression assumes a multinomial distribution and thus accommodates categorical dependent variables with more than two categories and both categorical and continuous independent variables. Simple logistic regression assumes a binomial distribution, and thus accommodates only models with dichotomous dependent variables. Loglinear models accommodate polychotomous dependent variables but assume a Poisson distribution which does not appear appropriate for the dependent variable examined here. On limited dependent variables, see Maddala, 1983; Aldrich & Nelson, 1984; Agresti, 1990).

INDIVIDUAL-PERFORMANCE-CONTINGENT-COMPENSATION = a +
b1 MONITORING AS INCENTIVE BASIS + b2 MONITORING AS INCENTIVE ALTERNATIVE + b3 LN(ORGANIZATION SIZE) + b4 SPECIALTY + b5 AVERAGE MD TENURE + b6 NOT/FOR-PROFIT + b7 GROUP/IPA + b8 LN(ORGANIZATION AGE)

RESULTS

I present the results of the multinomial logistic regression for Hypotheses 1 and 2 in Table 2.5. The overall model (Models 1, 2, and 3 combined) is statistically significant, suggesting that the independent variables are associated with the dependent variable, individual-performance-contingent compensation.

Interpreting the results of the multinomial logistic model

Multinomial logistic regression estimates model parameters using the maximum-likelihood method. The estimated coefficients are thus those that make the observed results most likely. With three possible values of the dependent variable, individual-performance-contingent compensation, (0%, between 0 and 100%, and 100%), the model produces coefficients comparing the likelihood of observing one value of the dependent variable versus another value of the dependent variable. Model 1 in Table 2.5 provides coefficients suggesting the likelihood of observing 100% individual-performance-contingent compensation versus 0% individual-performance-contingent compensation. Model 2's coefficients suggest the likelihood of observing between 0% and 100% individual-performance-contingent compensation versus observing 0% individual-performance-contingent compensation. Model 3 offers coefficients suggesting the likelihood of observing 100% individual-performance-contingent compensation versus observing individual-performance-contingent compensation less than 100% but greater

TABLE 2.5: MULTINOMIAL LOGISTIC REGRESSION MODELS OF THE RELATIONSHIP BETWEEN INDIVIDUAL-PERFORMANCE-CONTINGENT COMPENSATION AND MONITORING

Dependent Variable Comparison:	Model 1 *All* vs. *no* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*	Model 2 *Some* vs. *no* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*	Model 3 *All* vs. *some* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors			
INTERCEPT	-.877	-.698	-.178
	[-.416]	[-.498]	[-.837]
	(1.839)	(1.912)	(1.623)
MONITORING AS	-.023	.071	-.094**
INCENTIVE	[-.977]	[1.074]	[-.910]
ALTERNATIVE	(.060)	(.062)	(.037)
MONITORING AS	-.012	-.004	-.007
INCENTIVE	[-.988]	[-.996]	[-.993]
BASIS	(.015)	(.011)	(.014)
ORGANIZATION SIZE	-.093	-.392**	.299**
	[-.911]	[-.676]	[1.349]
	(.156)	(.183)	(.130)
SINGLE/MULTI-	1.569	1.496	.073
SPECIALTY (0, 1)	[4.802]	[4.464]	[1.076]
	(1.141)	(1.157)	(.469)
AVERAGE MD	-.109**	-.166***	.057
TENURE	[-.897]	[-.847]	[1.059]
	(.049)	(.055)	(.040)
NOT/FOR-PROFIT (0, 1)	1.935***	1.916**	.019
	[6.924]	[6.794]	[1.019]
	(.880)	(.943)	(.796)
MEDICAL GROUP/IPA	-.820	-.172	-.648
(0, 1)	[-.440]	[-.842]	[.523]
	(.958)	(.980)	(.595)
ORGANIZATION AGE	.116	.269	-.152
	[1.123]	[1.309]	[-.859]
	(.326)	(.348)	(.218)
X^2 *(df=16)*	36.354***	36.354***	36.354***

Coefficients: *$p<.10$; **$p<.05$; ***$p<.01$; Coefficient antilogs in brackets. Standard errors in parentheses. N=160.

than 0%. Multinomial logistic regression estimates coefficients in log-odd units, and the significance of these coefficients is obtained through use of a Wald statistic (the square of the z test statistic, which divides B by its standard error) which has a X^2 distribution. The signs on these log-odd coefficients are indicative of the relationship between the independent and dependent variables: a positive coefficient suggests that the odds of individual-performance-contingent compensation are higher the larger the independent variable. The coefficients' antilogs, odds, provide a more accessible measure of the scale of those relationships: a coefficient of -.073 (the coefficient on monitoring as incentive alternative in Model 3) suggests that organizations which use monitoring as an alternative to incentive provision are .92 times less likely to use individual-performance-contingent compensation, controlling for all the other variables in the model.

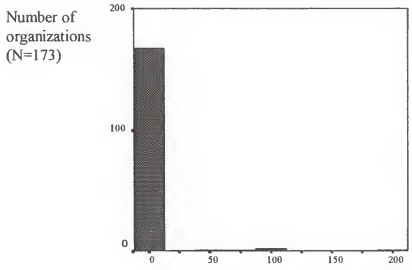
Description of results in relation to hypotheses

Support for Hypothesis 1's description of monitoring—as a basis for incentive provision—requires a positive and statistically significant coefficient on the monitoring as a basis for incentive provision variable. Support for Hypothesis 2's description of monitoring—as an alternative to incentive provision—requires a negative and statistically significant coefficient on the monitoring as incentive alternative variable. Additionally, the coefficients on organization size, traditional group versus IPA organization (IPA=1) and scope (multispecialty=1) should be positive and significant in each equation, while those on average MD tenure, for-profit organization (for-profit=1) and group age should be negative and significant in each equation.

Hypothesis 1 is not confirmed. Monitoring as an incentive basis does not demonstrate a statistically significant association with the level of individual-performance-contingent compensation in any of the models. Hypothesis 2 is mildly confirmed. Model 3 is the only model in which monitoring as an incentive alternative has a statistically significant association with the level of individual-performance-contingent compensation, and while in the predicted negative direction, the effect is relatively small. With respect to the control variables, organization size has a significant, positive association with the level of individual-performance-contingent compensation, as expected, in Model 3. In Model 2, however, and in contrast to the hypothesized model, organization size and individual-performance-contingent compensation have a significant and negative association. Single- or multi-specialty organization does not have a statistically significant association with the level of individual-performance-contingent compensation in any of the models. Both average physician tenure (negatively) and not-for-profit versus for-profit status (positively) are significantly associated with the level of individual-performance-contingent compensation in the expected way in Models 1 and 2. Medical group versus IPA organization and organization age do not have statistically significant associations with the level of individual-performance-contingent compensation in any of the models. These results are robust to the inclusion of alternative measures of each of the variables (continuous and dichotomous transformations) and to the inclusion and exclusion of those variables. Most importantly, the results are robust to the exclusion of the monitoring as incentive basis variable (see Table 2.6). As noted in the description of this variable, the vast majority of organizations did not report utilizing the information gleaned through

monitoring (or profiling, in these organizations) as a basis for individual-performance contingent compensation. Hence the value of the monitoring as incentive basis variable was often 0 (see Figure 2.5).

FIGURE 2.5: FREQUENCY WITH WHICH RESPONDENTS USED MONITORED INFORMATION AS A BASIS FOR FINANCIAL REWARD OR PUNISHMENT


Number of organizations (N=173)
200
100
0
0
50
100
150
200
Frequency with which monitored information was used as a basis for financial reward or punishment (please see page 36 for a discussion of the scale of this variable)

Leaving this variable out of the multinomial logistic regressions, however, does not change the results significantly (in terms of coefficients, signs, standard errors or statistical significance)—except that the monitoring as incentive alternative variable obtains greater statistical significance when the monitoring as incentive basis variable is excluded from the equations (compare Tables 2.5 and 2.6).

TABLE 2.6: MULTINOMIAL LOGISTIC REGRESSION MODELS OF THE RELATIONSHIP BETWEEN INDIVIDUAL-PERFORMANCE-CONTINGENT COMPENSATION AND MONITORING ONLY AS INCENTIVE ALTERNATIVE

Dependent Variable Comparison:	Model 4 *All* vs. *no* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*	Model 5 *Some* vs. *no* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*	Model 6 *All* vs. *some* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors			
INTERCEPT	-.959 [-.383] (1.816)	-.799 [-.450] (1.884)	-.160 [-.852] (1.627)
MONITORING AS INCENTIVE ALTERNATIVE	-.036 [-.965] (.056)	.063 [1.065] (.058)	-.099*** [-.906] (.037)
MONITORING AS INCENTIVE BASIS			
ORGANIZATION SIZE	-.078 [-.925] (.156)	-.387** [-.679] (.183)	.309** [1.362] (.130)
SINGLE/MULTI-SPECIALTY (0,1)	1.623 [5.069] (1.134)	1.514 [4.545] (1.150)	.109 [1.115] (.468)
AVERAGE MD TENURE	-.110** [-.896] (.049)	-.167*** [-.846] (.055)	.057 [1.059] (.040)
NOT/FOR-PROFIT (0,1)	2.057** [7.820] (.850)	2.028** [7.598] (.906)	.029 [1.029] (.789)
MEDICAL GROUP/IPA (0,1)	-.855 [-.425] (.956)	-.169 [-.845] (.976)	-.686 [.504] (.593)
ORGANIZATION AGE	.055 [1.057] (.318)	.230 [1.259] (.337)	-.175 [-.839] (.214)
X^2 *(df=14)*	36.708***	36.708***	36.708***

Coefficients: *$p<.10$; **$p<.05$; ***$p<.01$; Coefficient antilogs in brackets. Standard errors in parentheses. N=161.

Finally, the results are also robust to analyzing the model as a simple logistic regression, in which the dependent variable is dichotomous: 0 indicating the use of *some* individual-performance-contingent compensation (meaning that part of physicians' compensation was based on individual performance, while some portion was based on organizational performance), and 1 indicating the use of *all* individual-performance-contingent compensation (meaning that physicians' compensation was based only on individual performance) (see Table 2.7). Organizations reporting that they did not base any of their physicians' compensation on individual performance measures were not included in the logistic analysis, given the dichotomous nature of the dependent variable (hence N=139). The comparison made by the simple logistic model mirrors the comparison made by multinomial logistic Models 3 and 6 (Tables 2.5 and 2.6), and emphasizes the particular import of those models: only Models 3 and 6 focus on the two categories of *positive* individual-performance-contingent compensation (*some* or *all* individual-performance-contingent compensation). Multinomial logistic Models 1, 2, 4, and 5 compare each of these positive categories to the third category, no individual-performance-contingent compensation. Thus, while small and limited to the logistic model and multinomial logistic Models 3 and 6, the statistically significant association between monitoring as an incentive alternative and individual-performance-contingent compensation is found when the *key* comparisons are made. The association between organizational size and individual-performance-contingent compensation is also statistically significant in the logistic model, just as it is in multinomial logistic Models 3 and 6. Similar to the results of the multinomial logistic regression which excluded the

monitoring as incentive basis variable (Table 2.6), the association between monitoring as an incentive alternative and individual-performance-contingent compensation also obtains statistical significance when the logistic model excludes the monitoring as incentive basis variable (see Table 2.8) (and that statistical significance is greater than when the monitoring as incentive basis variable is included). The association between organizational size and individual-performance-contingent compensation is statistically significant in the logistic model which excludes the monitoring as incentive basis variable, just as it is in the multinomial logistic regression which excludes that variable. Finally, similar results obtain when not-for-profit organizations are excluded (hence N=131) from the logistic analysis (Table 2.9) and when both not-for-profits and the monitoring as incentive basis variable are excluded (Table 2.10), suggesting that differences between for-profit and not-for-profit organizations do not drive the results. Results of a cumulative logit analysis also supported those presented here.

DISCUSSION

The statistically significant relationship between monitoring as incentive alternative and individual-performance-contingent compensation in multinomial logistic Models 3 and 6 and the logistic models offers limited support for Hypothesis 2, that the use of monitoring as an incentive alternative will be negatively related to the use of incentives. The lack of a statistically significant relationship between monitoring as an incentive basis and individual-performance-contingent compensation in any of the models offers no support for Hypothesis 1, that the use of monitoring as a basis for incentive provision will be positively related to the use of incentives.

TABLE 2.7: LOGISTIC REGRESSION MODEL OF THE RELATIONSHIP BETWEEN INDIVIDUAL-PERFORMANCE-CONTINGENT COMPENSATION AND MONITORING	
Dependent Variable Comparison:	*All* vs. *some* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors	
INTERCEPT	-.062 [-.940] (1.620)
MONITORING AS INCENTIVE ALTERNATIVE	-.098** [-.907] (.039)
MONITORING AS INCENTIVE BASIS	-.008 [-.992] (.014)
ORGANIZATION SIZE	.291** [1.338] (.132)
SINGLE/MULTI-SPECIALTY (0,1)	.121 [1.129] (.481)
AVERAGE MD TENURE	.045 [1.046] (.041)
NOT/FOR-PROFIT (0,1)	.055 [1.057] (.799)
MEDICAL GROUP/IPA (0,1)	-.656 [.519] (.605)
ORGANIZATION AGE	-.155 [-.856] (.222)
X^2 *(df=8)*	17.085**
Coefficients: *$p<.10$; **$p<.05$; ***$p<.01$. Coefficient antilogs in brackets. Standard errors in parentheses. N=139.	

TABLE 2.8: LOGISTIC REGRESSION MODEL OF THE RELATIONSHIP BETWEEN INDIVIDUAL-PERFORMANCE-CONTINGENT COMPENSATION AND MONITORING ONLY AS INCENTIVE ALTERNATIVE	
Dependent Variable Comparison:	*All* vs. *some INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors	
INTERCEPT	.011 [1.011] (1.620)
MONITORING AS INCENTIVE ALTERNATIVE	-.104*** [-.901] (.038)
MONITORING AS INCENTIVE BASIS	
ORGANIZATION SIZE	.303** [1.354] (.131)
SINGLE/MULTI-SPECIALTY (0,1)	.158 [1.171] (.480)
AVERAGE MD TENURE	.044 [1.045] (.041)
NOT/FOR-PROFIT (0,1)	.043 [1.044] (.801)
MEDICAL GROUP/IPA (0,1)	-.696 [.499] (.604)
ORGANIZATION AGE	-.181 [-.834] (.219)
X^2 *(df=7)*	17.580**
Coefficients: *$p<.10$; **$p<.05$; ***$p<.01$. Coefficient antilogs in brackets. Standard errors in parentheses. N=140.	

TABLE 2.9: LOGISTIC REGRESSION MODEL OF THE RELATIONSHIP BETWEEN INDIVIDUAL-PERFORMANCE-CONTINGENT COMPENSATION AND MONITORING (WITHOUT NOT-FOR-PROFIT ORGANIZATIONS)	
Dependent Variable Comparison:	*All* vs. *some* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors	
INTERCEPT	.211 [1.235] (.842)
MONITORING AS INCENTIVE ALTERNATIVE	-.089** [-.915] (.039)
MONITORING AS INCENTIVE BASIS	-.009 [-.991] (.014)
ORGANIZATION SIZE	.257* [1.293] (.132)
SINGLE/MULTI-SPECIALTY (0,1)	.029 [1.029] (.495)
AVERAGE MD TENURE	.042 [1.043] (.041)
NOT/FOR-PROFIT (0,1)	
MEDICAL GROUP/IPA (0,1)	-.556 [.573] (.618)
ORGANIZATION AGE	-.186 [-.830] (.224)
X^2 *(df=7)*	13.691**
Coefficients: *$p<.10$; **$p<.05$; ***$p<.01$. Coefficient antilogs in brackets. Standard errors in parentheses. N=131.	

TABLE 2.10: LOGISTIC REGRESSION MODEL OF THE RELATIONSHIP BETWEEN INDIVIDUAL-PERFORMANCE-CONTINGENT COMPENSATION AND MONITORING ONLY AS INCENTIVE ALTERNATIVE (WITHOUT NOT-FOR-PROFIT ORGANIZATIONS)	
Dependent Variable Comparison:	*All* vs. *some* *INDIVIDUAL PERFORMANCE-CONTINGENT COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors	
INTERCEPT	.267 [1.306] (.839)
MONITORING AS INCENTIVE ALTERNATIVE	-.095** [-.909] (.039)
MONITORING AS INCENTIVE BASIS	
ORGANIZATION SIZE	.271* [1.311] (.131)
SINGLE/MULTI-SPECIALTY (0,1)	.068 [1.070] (.494)
AVERAGE MD TENURE	.042 [1.043] (.041)
NOT/FOR-PROFIT (0,1)	
MEDICAL GROUP/IPA (0,1)	-.602 [.548] (.615)
ORGANIZATION AGE	-.215 [-.807] (.226)
X^2 *(df=6)*	14.078**
Coefficients: *p<.10; **p<.05; ***p<.01. Coefficient antilogs in brackets. Standard errors in parentheses. N=132.	

These results corroborate agency theory's approach to the relationship between incentives and monitors as an incentive alternative, but suggest that discussions of the relationship between incentives and monitors as an incentive basis would benefit from further empirical investigation. These results suggest that the particular form of monitoring examined here—retrospective profiling in insurer-contracted medical groups—is somewhat superfluous to the incentive structures of these organizations. While there is some evidence that profiling serves as a substitute governance mechanism to incentives, the association is small and not consistent across models. In addition, profiled information does not appear to be utilized as a basis for incentive provision. Instead, these organizations rely on salary—which requires relatively little information about performance—or either an equal share in profits, or a share based on physician productivity--both measured almost by default: profits by what is left in the drawer after expenses are paid, and productivity through physicians' charges or receipts.[20]

The results with respect to the other explanatory variables offer some support for the study's expectations about the effect of ease or difficulty of monitoring on the provision of individual-performance-contingent incentives. The statistically significant and negative relationship between organizational size and individual-performance-contingent compensation in multinomial logistic Models 3 and 6 and the logistic models supports the logic that monitoring individual performance is more difficult in large organizations, making individual-performance-contingent compensation the efficient choice. The

[20] Only small organizations share profits equally, while salary and productivity-based sharing are found in both large and small organizations.

statistically significant and positive relationship between organizational size and individual-performance-contingent compensation in multinomial logistic Model 2, however, suggests that mixing individual- and organizational- performance-contingent compensation may be more costly than monitoring in large organizations. The negative and significant relationship between average physician tenure and individual-performance-contingent compensation in multinomial logistic Models 1, 2, 4 and 5 supports the suggestion that monitoring is easier in organizations in which the physicians are familiar with each other's practice styles, and hence monitoring is the more efficient governance alternative. The positive and significant relationship in multinomial logistic Models 1, 2, 4 and 5 between for-profit organization and individual-performance-contingent compensation offers support for the argument that in for-profit organizations, in which additional monitors appear in the form of residual claimants (owners), monitoring is more efficient that incentive provision.

Generally, the results suggest that large organizations, in which monitoring is more difficult than it is in small organizations, tend to use all rather than no individual-performance-contingent compensation, but they are less likely to use a combination of individual- and organizational- performance-contingent compensation than they are to use no individual-performance-contingent compensation at all. The results also suggest that for-profit organizations (which have owners to act as monitors) use more individual-performance-contingent compensation than not-for-profits (which don't have owner-monitors), and that organizations in which the physicians know each better (have longer tenure) use less individual-performance-contingent compensation than those in which

physicians are unfamiliar with each other. Physician organizations also appear to collect information that they do not use as a basis for individual-performance-contingent compensation, and while some of them substitute between monitoring individual performance and providing incentives meant to encourage that performance, monitoring is not a systematic alternative to incentive provision.

The lack of a robust, systematic relationship between incentives and monitors in these organizations may reflect the transitory nature of the environment in which these medical groups find themselves, and may be specific to the distinctive conditions of California's health care industry, specifically fierce competition for enrollees among managed care providers. While the hypotheses attempt to develop agency theory through the use of several behavioral concepts, agency theory itself is an equilibrium theory, and hence not well suited to describing a dynamic environment. Insurer-contracted medical groups are to a very real extent new organizational forms and a great deal of variety remains in their incentive and monitoring arrangements. Capitation, for example, and thus a different source of financial risk, has only recently become a reality for many medical groups. The weak relationships between incentives and monitors may indicate trial and error learning on behalf of these groups, a behavior not well accounted for by agency theory, and not well described with cross-sectional data.

Alternatively, while the information monitored by these organizations is not used as a basis for individual-performance-contingent compensation, it might be used for other types of incentives: respect, power, or status. The collection of this information might also bolster the threat of its use as basis for individual-performance-contingent

compensation in the future, whether or not it is used contemporaneously. Other monitoring mechanisms also exist—the board of directors, utilization management committees, quality assurance programs—and the information they monitor might be related to incentive provision. Hence the results highlight the complex nature of organizational governance configurations, and the difficulties of linking the provision of incentives to the monitors which serve either as a basis for those incentives or as an alternative governance mechanism.

Additionally, while this paper addresses Rediker & Seth's (1994) call for an examination of compensation mechanisms in combination with the governance mechanisms of managerial monitoring that they address, it does not report on the impact of bundles of governance mechanisms on firm strategy and performance. The distinctions made here between incentives and monitors are particularly relevant, however, to questions regarding the effects of governance configurations on performance. Zajac & Westphal (1994) suggest that incentives and monitors may have differential effects on individual and organizational behavior and performance, while Tosi, Katz, & Gomez-Mejia (1997) find that indeed they do—with incentives proving more effective than monitors. Precisely distinguishing between incentives and monitors is crucial to examining these differential effects.

In the provision of health care, quality is a performance measure of particular importance, making performance measurement inherently difficult, but also of extreme significance. Empirical evidence on the quality of care implications of governance configurations, however, remains limited. Parker (1979) found that physician ownership

(and thus presumably at least some organizational-performance-contingent compensation) was positively related to several measures of primary care performance in multispecialty group practice. Gaynor & Pauly (1990) found that productivity-based compensation scales (individual-performance-contingent compensation) increased productivity, in number of office visits per week. Rosenberg (1995) found that utilization review (monitoring, although Rosenberg makes no distinction between monitoring as incentive basis or alternative) reduced the number of diagnostic and surgical procedures. Similar to the studies of governance in the management literature, these studies each address only one element of the governance configurations present in organizations. Empirical research utilizing a configurational approach to governance and a host of quality measures would provide practitioners, policy makers, and health care consumers the information they need to evaluate their options. For organizational theorists and strategists, investigating governance configurations in the important and complex context of health care provision will aid in the broader task of understanding organizational governance and its implications for organizational performance more generally.

"Nor are the greatest outward precautions comparable in efficacy to the monitor within."

(Mill, 1926, cited in Gouldner, 1954)

CHAPTER 3: PROFESSIONAL ORGANIZATIONS: INFORMATION, AGENCY, AND GOVERNANCE

Professionals work in organizations (Barley & Tolbert, 1991; Greenwood, Hinings, Brown & Cooper, 1997). 59% of American physicians worked in organizations in 1994 (Kletke, Emmons & Gillis, 1996), 55% of lawyers in the U.S. worked in organizations in 1991 (Curran & Carson, 1994), and 77% of U.S. accountants worked in organizations in 1987 (AICPA, 1997). While most of us regularly consume services provided by these organizations, little empirical attention has been paid to the structure of professional service firms (Barley & Tolbert, 1991), and recent theoretical accounts critique the ability of popular organizational theories to explain these organizations (Sharma, 1997). One of these theories—the economic theory of agency—has, in fact, had much to say about the organization of professional service firms (Fama & Jensen, 1983a&b). This paper responds to critiques of the theory's applicability, and ultimately tests the theory's usefulness against empirical data on the structure of one type of professional organization: insurer-contracted medical groups.

Examining the organization of professional service firms from an agency theoretic lens reveals important information on the incentives faced by those who provide professional services. Much has been made recently of the compensation arrangements faced by physicians (Starr, 1982; Salmon, White & Feinglass, 1990; Woolhandler & Himmelstein, 1995). As yet, however, we do not well understand the realities of these or other professional organizations—and without understanding, sound evaluation remains difficult (Barley & Tolbert, 1991; Kerr et al., 1995; Gold, Nelson, Lake, Hurley, & Berenson, 1995a&b; Sharma, 1997). Detailing the structures found within professional

organizations will also help to describe the menu of arrangements organizations use to manage the behavior of organizational participants, maintain order, and promote organizational welfare.

BACKGROUND

Agency theory and professional organizations

As a theory of organizational governance, agency theory approaches the firm as a nexus of contracts between principals (residual claimants) and agents (decision-makers) (Jensen & Meckling, 1976; Fama, 1980). Assumed differences between the interests of principals and agents makes the separation of ownership and control, or more correctly, the separation of risk-bearing and decision-making, the central problem of organizational governance (Fama & Jensen, 1983a&b). In their refinement of Jensen & Meckling's original contribution, however, Fama & Jensen (1983a&b) break-down the decision-making process into steps, and suggest that there might be separation among these steps:

> In broad terms, the decision process has four steps:
> 1) initiation—[the] generation of [initiatives] for resource utilization…;
> 2) ratification—[the] choice of…initiatives to be implemented;
> 3) implementation—[the]execution of ratified [initiatives];
> 4) monitoring—[the] measurement of the performance of decision agents and implementation of rewards. (Fama & Jensen (1983a: 303)

As the initiation (step 1) and implementation (step 3) of decisions are typically allocated to the same agents, Fama & Jensen combine these two functions under the term "decision management". Similarly, they include ratification (step 2) and monitoring (step 4) of decisions under the term "decision control".[1] Decision management and decision control

[1] Note that Fama & Jensen's (1983a) definition of monitoring suffers from the lack of distinction (addressed by Chapter 2) between monitoring as an incentive basis, monitoring as an incentive alternative, and monitoring as incentive provision. As in Chapter 2, I include both monitoring as an incentive basis and

thus become the two key components of the organization's decision-making process or decision system.

It is the combination of these two steps (decision management and decision control) in individual decision-makers that results in a special class of agency problem in professional organizations. Fama & Jensen include professional organizations in their list of so-called "noncomplex" organizations--those organizations in which the steps of the decision process (decision management and control) are combined in individual agents given the importance of specific information about clients. Specific information is "detailed information that is difficult or costly to transfer among agents" (Fama & Jensen, 1983a: 305). Fama & Jensen do not offer examples of such information, but in professional organizations, this information might be a cardiologist's reading of an electrocardiogram, or a tax attorney's understanding of his client's fiscal position. Comprehension of specific information requires professional knowledge. For the cardiologist, sharing information about a patient's electrocardiogram with many other agents in the organization remains difficult because understanding requires training in cardiology and more specifically in the reading of electrocardiograms. Similarly, the tax attorney might find it difficult to explain his client's financial standing to the client's criminal defense team because of the different professional expertise of tax and criminal lawyers.

Certainly, some professional organizations have greater difficulty with the transfer of specific information across agents than do other organizations. Organizations

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monitoring as an incentive alternative in my definition of monitoring here, but I do not include incentive

in which all agents have similar training might, for example, have less difficulty. A medical group consisting only of cardiologists, or a legal practice specializing in tax, would encounter fewer obstacles in transferring specific information across physicians or lawyers than would multi-specialty medical or law practices. Given commensurate education, experience, skills and interests, decision-makers in specialized professional organizations ought to communicate more easily than those in more comprehensive organizations. While Fama & Jensen (1983a) take it as given that optimal organizations in some activities combine decision management and control in individual agents, I test the following hypothesis:

Hypothesis 1: Greater difficulty in the transfer of specific information leads to more combined decision management (initiation and implementation) and decision control (ratification and monitoring) in individual professionals.

Agency theorists further predict that professional organizations develop unique organizational characteristics in response to the peculiar problem of combined decision management and control. Specifically, Fama & Jensen (1983a: 304) explicitly state (hence the hypothesis is offered as a quotation) that organizations characterized by combined decision management and control deal with the resulting class of agency problems through restrictions on these organizations' residual claims.

Hypothesis 2: "Combination of decision management and decision control in a few agents leads to residual claims that are largely restricted to these agents."

Thus, when it is efficient to combine decision management and control functions in one or a few agents, it is also efficient to control agency problems between residual claimants

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provision (see also page 64).

and decision-makers by restricting residual claims to decision-makers. Restricting residual claims to decision-makers means that only the organization's decision-makers can hold residual claims, and they must return them to the organization if they terminate their role with the organization. Residual claims are contracts which entitle the bearer to a share in the organization's net cash flows (the difference between the organization's income and expenditures, or "residual"—hence the term "residual claim"). The holders of these claims--commonly referred to as owners—are referred to more precisely by Fama & Jensen (1983a&b) as residual claim*ants*, or as residual risk bearers (for they bear the risk associated with the residual).

It is the separation of residual risk-bearing from decision-making that results in the most general class of agency problems. The solution to these general problems lies in the use of incentives and/or monitors (Jensen & Meckling, 1976). Agency theorists' remiss definitions of these alternative mechanisms aside (see Chapter 2), the provision of incentives generally refers to reward or punishment, while monitoring refers to the collection of information on the agent's behavior (which may or may not be used as the basis for incentive provision). Implicitly, monitoring is conducted by someone other than the agent himself. In organizations with specific information, however, such second-party monitoring remains impossible, for decision management (initiation and implementation) and decision control (ratification *and monitoring*) are combined in individual decision-makers. That is, individual decision-makers ratify *and monitor* their own initiatives and decisions given the costliness of having anyone else do so. The

difficulty of transferring the information behind those initiatives and decisions is the source of these costs.

Residual claimants in noncomplex organizations are thus forced to rely on incentives. Incentives reward or punish agents' behavior, and can be based either on individual or organizational performance. In an organization, however, incentives based only on individual performance do not encourage cooperation among participants (unless cooperation helps all involved individuals). By shifting agents' focus to organizational performance, rather than their own individual performance, incentives based on organizational performance instead reward cooperative behavior even if cooperation helps only one agent better advance the organization's performance. Organizational-performance-based incentives additionally reward individual performance, as long as that individual performance furthers the performance of the organization as a whole.

Residual claims are one type of organizational-performance-based payment, as they pay the agent who holds them more when the organization's residual is large than when that residual is small. By hypothesizing that noncomplex organizations restrict residual claims to the agents in whom decision management and decision control are combined, agency theorists simply suggest that because there is no alternative for aligning agents' interests with those of principals (as agents monitor themselves), these organizations must use incentives, and organizational-performance based ones are the most efficient—they make the best trade-off between benefits and costs. While organizational-performance-based payments, or pooling arrangements, may encourage free-riding, they also encourage mutual monitoring and consulting among professionals,

presumably thus improving the quality of services provided and reducing the potential for liability losses (Fama & Jensen, 1983b).

The restriction of residual claims to the decision-makers in whom decision management and control are combined, however, sacrifices the benefits of unrestricted residual risk-sharing—access to more diverse and potentially larger stocks of capital (Fama & Jensen, 1983a&b). Thus the combination of decision-management and control sacrifices the benefits of specialization among the steps of the decision-process: some agents might be better at initiating and implementing (decision management) than they are at ratifying and monitoring (decision control), just as some scholars feel they are better editors (ratifying and monitoring) than writers (initiating and implementing). Organizations which combine the steps of the decision process in individual agents thus suffer efficiency losses because decision agents must be chosen on the basis of wealth and willingness to bear risk *as well as* for both decision management and decision control skills. The benefits of unrestricted residual risk sharing and decision function specialization in these organization are presumably less, however, than the costs that would be have to be incurred otherwise to control agency problems. For agency theorists, organizational survival requires a balance between the costs of particular decision systems and residual claim allocations against their benefits.

In large professional organizations, the benefits of restricted residual claims are reduced. An increased number of decision-makers means that each can claim a smaller share of the organization's residual, and thus a smaller share of the benefits or losses to their own behavior. Residual risk-bearing and decision-making (ownership and control)

are effectively separated. Agency theorists suppose that organizations subject to such separation, and consequent agency problems, respond by separating the steps of the decision process. While costly, such separation, and thus the forced spread of difficult (and thus expensive) to transfer information, is less costly than enduring the potential non-residual claimant directed behavior encouraged by the separation of residual risk-bearing and decision-making. Fama & Jensen (1983a) thus hypothesize both that:

H3: Organizations in which decision management and decision control are combined are generally smaller than organizations in which decision management and decision control are not combined.

and explicitly (hence another hypothesis offered as a quotation) that:

H4: "Separation of residual risk-bearing from [decision-making] leads to decision systems that separate decision management from decision control." (Fama & Jensen, 1983a: 304)

Although Fama & Jensen are inconsistent in specifying the causal relationship between the separation of risk-bearing and decision-making and the separation of decision management and decision control (Hypothesis 2 suggests that the latter leads to the former while Hypothesis 4 suggests that the former leads to the latter), their hypotheses more generally question when the separation of decision management, decision control, and residual risk-bearing is more efficient than combining these three functions in the same agent. Which factors make the combination of decision management, decision control, and residual risk-bearing more efficient—and when is it more efficient to separate them? Organizations consistent with Hypothesis 2 would be characterized by decision-makers who both manage and control decisions, and are also owners of the organizations in which they make decisions. Organizations consistent with

Hypothesis 4 would be characterized by decision-makers who manage but do not control decisions (or who control but do not manage decisions), and who are not owners of the organizations in which they make decisions.

In spite of an extensive theoretical literature on professional organizations (Parsons, 1960; Blau & Scott, 1963; Scott, 1982; Gaynor, 1997), little empirical work has been done to systematically examine the governance structures in use by professional organizations (Barley & Tolbert, 1991; Kerr et al., 1995; Gold, Nelson, Lake, Hurley, & Berenson, 1995a&b; Sharma, 1997). Particularly relevant examples address the relationship between size, complexity, and the number of levels in the administrative hierarchy, formalization, and the locus of decision-making (Kralewski, Pitt & Shatin, 1985), and that between size, specialization, spatial differentiation and client concentration on the collegiality of compensation and promotion decisions (Tolbert & Stern, 1991). Gaynor & Gertler (1995) and Lang & Gordon (1995) both take an explicitly agency theoretic approach to professional organizations (medical groups and law firms, respectively), but do not explore the relationship between specialization, decision-making hierarchies, and ownership structures discussed here.[2] More generally, while several researchers have examined the effects of ownership on other governance mechanisms—compensation level (Stigler & Friedland, 1983)—and the effects of *external* monitoring (regulation) on ownership (Demsetz & Lehn, 1985), the relationship between ownership and the allocation of steps in the decision-making process has not yet

[2] Gaynor & Gertler (1995) find that groups of more risk averse physicians choose more risk-sharing compensation arrangements than do less risk averse physicians, while Lang & Gordon (1995) find that larger law practices choose compensation arrangements that share risk to a greater extent than do smaller practices.

been widely studied empirically--in professional organizations or otherwise. Following a response to a recent critique of agency theory's applicability to professional organizations, I empirically test agency theory's hypotheses about specialization, decision-making, and ownership in these organizations.

A critique of agency theory's applicability to professional organizations

A recent critique of agency theory (Sharma, 1997) suggests the inapplicability of this framework to the question of professional organization. This critique, however, neglects several of agency theory's key points, and ignores the explicit hypotheses (H1-H4 above) agency theorists have made about professional service firms (Fama & Jensen, 1983a). I address the critique, but also offer an empirical test of agency theory's hypotheses—providing evidence for a more comprehensive examination of agency theory's applicability to professional organizations.

Sharma (1997) suggests several attributes which make principal-professional exchanges intrinsically distinct from other agency relationships, such as those between owners and managers. The first of these attributes is based on a distinction between information and knowledge. Sharma suggests that when professionals are agents, the division of labor between agent and principal is also a division of *knowledge*, as opposed to information, and claims that the "the importance of *knowledge* [is] not sharply articulated in agent models" (Sharma, 1997: 759, my italics). In contrast, he recognizes the key role of information in agency relationships: "Resolution of [agency problems] is difficult...because of information asymmetry favoring agents...." and that "agency theory is founded on the triad of agent opportunism, information, and risk." (p. 760).

Sharma analogizes the difference between information and knowledge to that between "know-what and know-how" (p. 768). Principals can certainly purchase information on "what" a professional agent does—did my physician take a blood sample?—but they remain unable to purchase the "know-how" necessary to evaluate whether that test was necessary because of the "specialized *and* dynamic" nature of that knowledge (Sharma, 1997). Fama & Jensen's (1983a) "specific information", however, appears to fall in the realm of Sharma's "knowledge", if the key difference between information and knowledge is the difficulty (or costliness) of transfer. Thus agency theorists have, in fact, explicitly included knowledge in their models of information asymmetry, and have formulated hypotheses explicitly examining the implications of that this kind of asymmetry for professional organizations (Fama & Jensen, 1983a&b). Oddly, Sharma cites Fama & Jensen (1983a) as part of the limited domain of agency theory (owner-manager relationships) he critiques (p. 766).

The second of the attributes Sharma suggests make professionals distinct from classical agents is professional agents' embeddedness in their professional communities. He suggests that such embeddedness makes them less prone to maximize their own self-interest at the expense of principals' (patients, defendants, taxpayers). For agency theorists, however, these communities are simply a form of monitor, arising from the inability of clients to evaluate provided services (given knowledge asymmetry) and the market for corporate control's limited ability to discipline professional firms given restrictions on professional ownership of those firms. Agency theory thus allows for the inclusion of greater efficiency of peer review in models of professional governance, and

in fact explicitly describes the very similar mechanism of internal labor markets for managers (Fama, 1980).

The third of the attributes Sharma suggests make professionals distinct from classical agents is the co-produced nature of the service provided. He suggests that in contrast to the relatively hands-off relationship between diffuse owners and corporate managers, professional agents work in consultation with their clients to create jointly the product desired by the client. For agency theorists, such interaction simply enables monitoring and ratification of the agent's behavior by the client—an avenue through which he collects information on the agent's behavior and makes clear his preferences for that behavior. Thus, agency theory allows for the inclusion of interaction between principal and agent as a form of monitoring.

While agency theory allows for the three key differences Sharma identifies, there remains an additional difference not identified by Sharma but worth noting that distinguishes agency theorists' approach to professional organizations from other approaches (including Sharma's). Professionals in organizations face two principals, the owners of the organization, and their clients. Fama & Jensen's (1983a&b) hypotheses all relate to the interests of owners, on the assumption that by satisfying the interests of owners, those of clients will also be satisfied. Sharma's hypotheses all relate directly to the interests of consumers. This distinction relates to Sharma's suggestion that agency theory assumes principals' ability to design and enforce contracts to limit the self-serving behavior of managers. Sharma neglects to note that principals' influence over contract terms is limited by agents' ability to walk away from those terms—an ability that is

reduced in the case of professionals, given the monopoly power professionals have over their services (Larson, 1977). This monopoly power is in contrast to the price-taking (and contract-accepting) behavior of the standard agent identified in most agency models. Consumers in professional-agent relationships thus have relatively little choice over the design or enforcement of contracts. Consumers' ability to design and enforce professional contracts is additionally limited by payment arrangements in many professions: witness the doctor-patient relationship, in which a third party generally designs and enforces contracts with the professional and pays for services provided to the patient. For professionals in organizations, these third-party payers often contract with the organization as a whole, and the organization in turn contracts with individual professionals. Contracts between organizations and professionals, especially if residual claimants are also professionals (as is the case with many law, accounting, and medical practices) more closely approximate standard agency relationships because the monopoly power of the agent professional is smaller relative to an organization than it is to an individual consumer. Contracts between consumer and professional often remain implicit, and prone to debate.[3] While these implicit contracts deserve study, as highlighted by Sharma (1997), so too do the explicit contracts that exist between organizations and professionals—those focused upon by Fama & Jensen (1983a&b), hypothesized above, and tested below.

[3] See Elms, Berman & Wicks, 1998 on current debates about the fiduciary duty of physicians, for example.

METHOD

Medical group population

Professional service firms include organizations of lawyers, accountants, doctors, consultants, investment bankers and engineers (Liedtka, Haskins, Rosenblum & Weber, 1997). I examine the decision-making systems and ownership structures present in physician organizations—commonly referred to as medical groups. These organizations offer an excellent arena in which to test Fama & Jensen's hypotheses, given the centrality of detailed information about patients that is costly to transfer across physicians. In addition, while the difficulty of separating the steps of organizational decision systems (initiation, ratification, implementation, & monitoring) in other settings might make examining the relationship between these steps and ownership difficult, several management techniques in use by physician organizations make the steps of the decision system very transparent.

Examining the relationship between decision systems and ownership structures in medical groups has policy as well as management implications. The providers of health care for indemnity insurers and increasingly of managed care services (providing care to 69% of those enrolled in HMOs in the United States--see Hoechst Marion Roussel, 1997), medical groups remain relatively unexplained organizational forms (Kerr et al., 1995; Gold et al., 1995 a&b).[4] These organizations provide care under contract with

[4] Until recently, staff- and group- model health maintenance organizations (HMOs) provided the vast majority of managed care services. In these HMOs, physicians (referred to as MDs in the tables) are either employees of the HMO (in the case of the staff-model HMO), or are employed by a large medical group that contracts exclusively with a single HMO (in the case of the group-model HMO). Physicians employed by these two types of organizations care only for patients enrolled in the single HMO for which the

multiple insurers, in which each insurer contracts with multiple medical groups to provide care for the insurer's enrollees, and each medical group in turn contracts with multiple insurers (Kerr et al., 1995; Gold et al., 1995 a&b; Robinson & Casalino, 1995 & 1996). Hillman et al. (1992: 137) refer to these arrangements as "three-tiered", in which the insurer constitutes the first tier, the medical group comprises the second tier, and member physicians make up the third tier. Contracts between insurers and medical groups are characterized by either fee-for-service compensation or capitation. Fee-for-service compensation provides the medical group with a payment *for every service* they provide to the contracting insurer's enrollees. Under capitation, the medical group instead receives a payment *for every enrollee*, every month, from which the medical group is meant to cover the cost of all services provided to that enrollee. The medical group pools these capitated payments, and essentially pay for all care from a central fund. Thus, while the total costs of care for a particular patient(s) may exceed the sum of the payments provided by the insurer for that patient's (patients') care, those costs are paid out of the insurers' payments for patients whose total care costs are less than those payments. The medical group retains the difference between the cost of the services they provide and the capitated payments, but they also accept financial risk for any costs of enrollees' care that exceed the sum of these payments.

Although these medical groups contract with insurers to provide care for the insurers' enrollees, control over their own internal governance mechanisms remains with the groups (Hillman, Welch, & Pauly, 1992; Kerr et al., 1995). Groups retain control

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physician works or with which the physician's medical group contracts. See Table 2.2 for a comparison of

over how they structure their ownership and how they design monitoring mechanisms internal to the group (although contracting insurers usually require some basic monitoring mechanisms without detailing their structure) (Hillman et al., 1992; Kerr et al., 1995). Recent empirical examinations of medical groups, however, remain descriptive and have yet to systematically assess these organizations' consistency with theories of organizational governance (Kralewski et al., 1996; Trauner & Chesnut, 1996; Conrad et al., 1996).[5] Beyond knowing that the development of governance arrangements remains within the medical groups' purview, researchers know relatively little about these mechanisms:

> The middle level of a managed care organization in three-tiered arrangements [in which the insurer constitutes the top tier, the medical group comprises the middle tier, and member physicians make up the bottom tier] is an important feature that is not well understood...few studies detail the organizational form of [this] middle level, its functions and how it modifies....the directness of the relationship between managed care plans and physicians. (Gold et al., 1995a: 321; see also Figure 2.3).

Meanwhile, concern continues to grow about the rise of capitated contracts and the use of innovative ownership and monitoring arrangements by medical groups (Starr, 1982; Salmon, White & Feinglass, 1990; Woolhandler & Himmelstein, 1995; also see reactions to Woolhandler & Himmelstein, 1996). Understanding the governance structures of medical groups would significantly improve our ability to evaluate the implications of these structures for health care delivery. Many health services researchers recognize agency theory's relevance to the organization of health care, but systematic tests of the theory's empirical implications in the health care sector remain

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HMO forms.

[5] Also see Hillman, Welch & Pauly, 1992; Gaynor, 1994; Kerr et al., 1995; Gold et al., 1995 a&b; and Robinson & Casalino, 1995 & 1996.

limited (Dranove & White, 1987; Salmon, White & Feinglass, 1990; Gaynor, 1994; Pontes, 1995; Gaynor & Gertler, 1996).

The sample

Detailed data on the governance mechanisms utilized by these medical groups come from a recent survey-based study of medical groups conducted by the author.[6] A sample of 1,000 California medical groups was selected from a population of 1,954 medical groups in California using a stratified random sampling method. The population was identified by combining directories of California medical group practices from the American Medical Association[7], the American Group Practice Association (now part of the American Medical Group Association), and the Medical Group Management Association[8], and by combing trade publications for names of existing medical groups. Faculty practice and group HMO medical groups (i.e., Kaiser Permanente Medical Group) were not included in the sample given their differences from the network-model-insurer contracted medical groups under focus. Given the skewed distribution of the population, large groups (those over the population's median size of 7) were targeted to insure that some responses would come from large practices (in which agency problems were expected to be greater).

[6] Tosi, Katz, & Gomez-Mejia (1997) suggest the use of traditional organizational science methodologies, including both laboratory studies and survey research, as a potentially more fruitful avenue for understanding the relationship between incentives and monitors complement than the archival economic and demographic data generally used.

[7] The American Medical Association's group directory is produced from their annual survey of individual practitioners, in which they ask those respondents who are medical group members for the name and address of the medical group with which they practice. Their survey is not limited to American Medical Association members.

[8] The American Medical Group Association and the Medical Group Management Association are the two predominant medical group associations in the country. Both associations' directories are limited to their members.

The survey

The 25-page survey was based on an agency theoretic model of the ownership and monitoring mechanisms specific to medical groups. These mechanisms were identified by reviewing the literature on medical group ownership structure and the physician monitoring techniques included under the general rubric of utilization management. Additionally, as part of this and several other related studies, the author conducted 120 exploratory, semi-structured interviews with medical directors, other key medical group administrators, and physicians in 17 managed care settings in 4 states: California (11 organizations), Texas (3 organizations), Minnesota (1 organization), and Maryland (2 organizations). A pilot test of the survey instrument was administered to 15 medical directors in California, 3 of whom agreed to serve on the project's advisory panel and provide additional comment. Finally, executives in 3 medical group management associations: the Medical Group Management Association (MGMA), the Independent Practice Assocation of America (IPAA) and the National Independent Practice Association Coalition (NIPAC) reviewed the survey instrument and provided input on its construction. The MGMA additionally provided a letter of support to be enclosed with each survey, while IPAA offered an endorsement mentioned in the survey's cover letter and an advertisement in their member newsletter encouraging participation. The cover letter also included references to the project's advisory panel and support from the VA/UCLA/RAND Center for the Study of Healthcare Provider Behavior and the UCLA Center for Health Services Management. The letter was signed by the physician directors of these two Centers, and by the author.

The survey was administered in several phases. Initially, all 1,000 organizations in the sample received the cover letter, MGMA letter, the survey, a brochure describing the study, and a self-addressed, postage-paid envelope. The survey packet was addressed to either the organization's medical director (these organizations' key physician executive) or, if no medical director existed, the organization's practice administrator (these organizations' key lay executive). These individuals were identified using the directories and other publications employed to identify the population (or by a telephone call if no other information was available). Two weeks later, non-respondents received a reminder post-card. Throughout the following month, non-respondents were telephoned randomly, and a randomly selected 750 of the initial 1,000 organizations received a second set of all survey materials with a revised cover letter at the end of that month. Randomly selected non-respondents continued to be telephoned throughout the next month, and a randomly selected 500 received another complete set of survey materials 6 weeks later. A randomly selected 250 of these 500 also received a $20 bill and a cover letter noting the gift's inclusion, but also asserting no obligation on the part of potential respondents. An additional postcard was sent to all non-respondents within this 500 organization subset 2 weeks later, and each organization received a telephone call. Two weeks later, a randomly selected 30 of the 250 organizations (within the 500 organization subset) which had not previously received the $20 gift received it, a complete survey packet, and a telephone call.

Of the original sample of 1,000 medical groups, 150 organizations were deleted from the sample population through random telephone follow-ups and directed telephone

follow-ups of returned-to-sender survey packets. These organizations had either ceased to exist altogether or had been acquired by another organization already included in the sample. 175 organizations responded to the survey, representing a response rate of 21%. Response rates for each contact are included in Figure 2.4 (Figure 2.4's Ns are reported minus the 150 organizations that were eventually deleted). Response rates were demonstrably higher among those who received the $20 gift, but because these organizations were randomly selected, any related bias should be relatively inconsequential.

Representativeness

Responding organizations appear to be representative of the population in terms of size, specialty, and geographical location. Respondents indicated the size of their organization as the number of physician members and contractors included in the organization.[9] The AMA directory, AGPA directory, MGMA directory, and several trade publications provided information on the size of 1,081 of the organizations in the population (N=1,954). The median size of responding organizations was 10 physicians—not significantly different from the population (on which there was available data) median of 7 physicians ($p > .10$).[10]

Respondents also indicated whether theirs was a primary care, single specialty, or multi-specialty organization. 55% of the responding groups identified themselves as single specialty, 21% identified themselves as primary care groups, and 24% identified

[9] Member physicians were defined for respondents as employees and/or partners whose primary or only employment was with the organization. Contractor physicians were defined as solo-practitioners, partners, and/or employees of another organization with whom the responding organization contracted to provide care to the responding organization's patients or enrollees.

themselves as multi-specialty groups. Hence the mode of organization among respondents was single-specialty. I coded the medical specialty of each group in the population (N=1,954) utilizing information included in the AMA directory, AGPA directory, and MGMA directory, and in cases where this information was missing, using clues provided by the name of the medical group (Arlington Radiology Medical Group, for example, was coded as a single-specialty organization). 55% of the groups in the population were identified as single-specialty organizations, while 14% were identified as primary care organizations and 31% as multi-specialty organizations. Similar to respondents, the population's mode of organization was single-specialty. The proportion of responses from single-specialty organizations matched the proportion of the population that was single-specialty (55%), but primary care groups appear to be mildly over-represented among respondents (21% of the respondents were primary care while 14% of the population was primary care), while multi-specialty groups appear to be mildly under-represented (24% of the respondents were multi-specialty while 31% of the population was multi-specialty) (see Table 2.1).

These apparent differences may, however, be the result of inaccuracies in the population statistics. The AMA directory distinguished only between single-specialty and multi-specialty organizations, coding primary care organizations as multi-specialty organizations. I attempted to correct for the lack of identification of primary care groups and over-identification of multi-specialty groups by recoding family practice groups, general practice groups, internal medicine groups, *general* pediatric groups (pediatric

[10] Given the left-skewed distribution of size, the median is more descriptive than the mean.

subspecialty groups, including pediatric neurology, were coded as single specialty groups) and those organizations with "primary care" included in the title of the group as primary care groups, since each of these types of practices often provide primarily primary care services. The population statistics still probably underestimate the proportion of primary care groups and overestimate the proportion of multispecialty groups, however, suggesting that the relatively small differences between respondents and the population may not even be as large as those indicated by the available statistics. Using postal service area 3-digit zipcodes, I compared respondents' zip-codes with those of organizations in the population. The proportion of respondents coming from each postal service area appears to be similar to the proportion of the population of organizations in each area (see Table 2.2).

Independent variables

Specialization

For Hypothesis 1, that greater specialization of difficult to transfer information leads to greater combination of decision management and control, I measured specialization as whether the medical group included physicians from a single or multiple specialties. In single specialty groups, all physicians have similar training and knowledge, and can share information about patients and monitor each other more easily than can physicians in multi-specialty groups, in which physicians come from a range of specialties and thus have different training and different knowledge. Single specialty organizations included, for example, cardiology groups, (in which all physicians were cardiologists), urology groups (in which all physicians were urologists) and primary care

groups (in which all physicians were primary care physicians). Seventy-six percent of the physician organizations examined here were single specialty organizations, while twenty-four percent were multispecialty organizations. I provide a complete list of included specialties in Table 3.1, descriptive statistics for all included variables in Table 3.2, and a correlation matrix in Table 3.3.

TABLE 3.1: SPECIALTIES REPRESENTED BY RESPONDENTS
Allergy
Anesthesiology
Cardiovascular Disease
Cardiovascular Surgery
Emergency Medicine
Gastroenterology
General Surgery
Gynecological Oncology
Hematology
Internal Medicine
Nephrology
Neurology
Obstetrics & Gynecology
Occupational Medicine
Oncology
Ophthamology
Orthopaedic Surgery
Otolaryngology
Pathology
Pediatrics
Pulmonary Disease
Radiology
Radiation Oncology
Urology

Decision management and control

For Hypotheses 1, 2, 3, and 4, I measure the combination or separation of decision management and control. Decision management includes initiation and implementation. A patient's treating physician has responsibility for both tasks, initiation

TABLE 3.2: DESCRIPTIVE STATISTICS (Means, Medians or Percentages*, Standard Deviations [S.D.], Minimums [Min.], and Maximums [Max.])

Variable:	Mean	Median or %*	S.D.	Min.	Max.
Specialty					
SINGLE=0, MULTI=1		24%			
Decision Management & Control:					
Ratification:					
PREAUTHORIZATION	3.77	1.00	6.56	0.00	40.00
As 0/1 (some preauthorization=1)		66%			
Monitoring:					
PROFILING	4.09	0.00	5.24	0.00	17.00
As 0/1 (some profiling=1)		44%			
Ratification &/or monitoring					
PREAUTHORIZATION &/0R					
PROFILING (RATMON)					
Do neither		24%			
Do either		43%			
Do both		33%			
Ownership					
% OF MDs WHO ARE OWNERS	64.51	72.73	34.40	0.00	100.00
Organization Size					
# OF MDs	106.65	9.50	339.90	3.00	3200.00
LN(# OF MDs)	2.80	2.30	1.73	1.10	9.50
Control variables (for ease/difficulty of monitoring)					
AVERAGE TENURE OF MDs	11.11	10.00	5.60	2.00	28.00
# OF MDs PER SITE	11.05	3.00	63.76	.50	800.00
LN(# OF MDs PER SITE)	1.16	1.10	1.03	-.69	6.68
ORGANIZATIONAL FORM					
(MG=0, IPA=1)		14%			

* Percentages are reported for 0/1 indicator variables

consisting of diagnosis and the suggestion of a treatment plan, while implementation entails the execution of the treatment plan through either personal involvement or referral. Hence, the two components of decision management lie with the treating physician. Under current physician management systems, however, the two steps of decision control (ratification and monitoring) may lie either with the treating physician or

TABLE 3.3: CORRELATION MATRIX FOR ALL VARIABLES

Variable:	2	3	4	5	6	7	8	9
1. Specialty (Multispecialty=1)	-0.07	0.16	0.15	-0.35	0.07	-0.29	-0.13	0.38
2. Preauthorization		0.23	0.36	0.08	0.02	0.03	0.00	-0.08
3. Profiling			0.45	-0.11	-0.01	-0.13	0.05	0.07
4. Preauthorization &/or Profiling (RATMON)				-0.16	0.06	-0.14	0.03	0.17
5. % of MDs who are owners					-0.08	0.35	-0.07	-0.33
6. Organization Size (Ln [# of MDs])						-0.15	0.32	0.10
7. Familiarity (Average MD tenure)							-0.08	-0.25
8. Ln(MDs per site)								-0.05
9. Organizational form (IPA=1)								-

with another physician, nurse, or with administrative personnel.

Ratification

I measure the separation of ratification from the treating physician's domain through the organization's use of preauthorization requirements. Preauthorization requirements indicate that someone in the group, be it a nurse, another doctor, or physician committee, must review the medical necessity of and authorize a treating physician's requests for specialty referrals, tests, and procedures before they are conducted. In general, the groups themselves, not the insurers with whom they contract, choose which services require preauthorization and implement programs through which physicians may seek preauthorization—by having another physician sign off on requests, by telephoning a nurse or utilization management department to obtain permission, etc. (Kerr et al., 1994). Thus, the treating physician's treatment plan must be approved (or

ratified) by another individual or administrative/clinical body. Since many physician organizations report that although they utilize preauthorization requirements, no requests are ever denied (Kerr et al., 1994), the measure of preauthorization requirements I use is the percentage of preauthorization requests that were denied. This measure gives a sense of the strength of the separation of ratification from the treating physician's domain of responsibility, rather than the potential for such separation. This measure ranged from 0-40%, and averaged 4%.

Monitoring

I measure the separation of monitoring from the treating physician's domain through the organization's use of retrospective profiling programs.[11] Retrospective profiling programs measure physicians' utilization patterns of various services. Profiled information may be provided to physicians and might include the number of patients a physician referred for specialty care in a given time period, the mean number of specialty referrals for his or her colleagues, and possibly a recommendation for change if the particular physician's performance rates far below or above the average. Thus, the treating physician's patterns of treatment are *monitored* by another individual or administrative/clinical body. I measure the level of monitoring as an index of 5 survey responses regarding the use of profiling (Cronbach's alpha=.87). Groups indicated whether they profiled physicians' utilization rates for ambulatory specialty referrals, ambulatory tests and procedures, pharmaceuticals, hospitalization rates, and whether they reviewed changes in utilization over time. Groups also indicated how regularly (monthly,

quarterly, semi-annually, annually, or never) they collected this information. The monitoring index would be equal to 20 for a group that reported profiling physicians on all of these indicators monthly (the most stringent response possible). This index would be equal to zero for a group that reported never profiling physicians on any of these indicators (the least stringent response possible). In reality, this index ranged from 0 to 17, and averaged 4 (annual review of four of the five utilization areas, usually not pharmaceutical utilization). This measure gives a sense of the strength of the separation of monitoring from the treating physician's domain of responsibility, rather than the potential for such separation.

The combination of decision management and control

Organizations characterized by the combination of decision management and control are those which do not use either preauthorization or retrospective profiling. Without preauthorization or retrospective profiling, physicians in these organizations initiate, ratify, implement and monitor their own treatment plans. The steps of both decision management (initiation and implementation) and decision control (ratification and monitoring) are combined in individual physicians.

The separation of decision management and control

Organizations characterized by the separation of decision management and control are those which use either or preauthorization or retrospective profiling, or both. The use of both mechanisms indicates separation of the steps of decision management and control. The use of one mechanism indicates partial separation. Fama & Jensen

[11] This measure of monitoring is the same as Chapter 2's measure of monitoring as an incentive alternative.

(1983a&b) do not address partial separation of decision management from control, instead assuming that the separation of decision management from control always involves both elements of the control component. I instead allow for partial separation of decision management from control with an additional, trichotomous measure, *RATMON*. *RATMON* indicates the use of neither, one, or both preauthorization and/or retrospective profiling, and thus the combination, partial separation, or complete separation of decision management and control.

Organizational Size

I measure organizational size as the number of physicians in the organization. The size of these organizations ranged from 3 physicians to 3,200 physicians. The distribution is highly skewed to the left, with a median of 10 physicians and a mean of 107 physicians, so a natural log transformation of this variable was used to normalize its distribution. One outlier, an organization of 13,410 physicians, was not included in the analysis.

Dependent variable

Ownership and the separation of risk-bearing and decision-making

I measure ownership as the percent of physicians in the group who are also owners of the group. In California, given restrictions against the so-called "corporate practice of medicine", the ownership of physician organizations is restricted to physicians in the group. Not all physicians in the group must be owners, however. The percentage of physicians who *are* owners gives an indication of the relative combination or

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Given the results of Chapter 2, and in an effort to simplify, the measure of monitoring as an incentive basis

separation of decision-making and risk-bearing: in an organization characterized by the combination of decision-making and risk-bearing, most of the physicians in the group are owners. In an organization characterized by the separation of decision-making and risk-bearing, few physicians are owners. The distribution of ownership (the percentage of physicians who are owners) is skewed to the right, and in 26% of the organizations, all of the physicians in the organization are owners.

Control variables

Fama & Jensen suggest the importance of informal monitoring as buttress to formal decision control systems (like preauthorization and retrospective profiling) (1983a&b). I utilize several variables indicating the ease of informal monitoring. I control for the average total tenure of physicians with the organization, assuming that the longer physicians have worked together, the better they are able to monitor each other. I also control for the average number of physicians per site, given that in larger organizations, physicians are only in regular contact and thus able to monitor the physicians with whom they share a site. I additionally control for the size of the organization as a whole, to capture the difficulty of monitoring physicians across sites. To make both size distributions (# of MDs per site and # of MDs total) better resemble a normal distribution, I utilized the natural log of both in the multivariate analysis. While organizational size and number of physicians per site are highly correlated (r=.74), the natural log transformations of each variable used in the estimation are not (r=.32).

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is not included here.

Finally, I control for organizational form (traditional group practice versus independent practice association), since these different structural arrangements might be expected to be associated with different degrees of monitoring difficulty (Kralewski, Pitt & Shatin, 1985). Traditional group practices, in which physicians share business and clinical facilities, records and personnel and often practice together at one site, offer greater opportunities for each group physician to monitor other group physicians. IPAs restrict such opportunities because although individual physicians or traditional group practices join an administrative body that negotiates the provision of their professional services to patients enrolled in managed care plans, individual physicians or traditional group practices maintain and see patients in their own, individual private offices. IPA physicians are not in contact with, and thus have little opportunity to monitor other physicians who are also members of their IPA, unless they are members of the same traditional group practice.[12]

Hypothesis testing methods and model

Given their amenability to a simple comparison of levels, I tested Hypotheses 1, 2, 3, and 4 with both t-tests and, given the categorical nature of several of the variables, non-parametric Wilcoxon rank sum tests. Given the results of the these tests, I also examined the relationship between the combination of decision management and control and ownership structure (Hypothesis 2), utilizing the control variables described, through an ordinary least squares estimation of the following regression equation:

[12] cf. Wholey, Christianson, & Sanchez, 1992 who similarly distinguish between group- and IPA-model HMOs, suggesting that physicians in group HMOs have more and stronger social and instrumental attachments to the HMO than do physicians in IPA HMOs.

% of MDs WHO ARE OWNERS= a + b1 PREAUTHORIZATION + b2 PROFILE +
b3 LN(ORGANIZATION SIZE) +
b4 LN(MDsPERSITE) + b5 SPECIALTY +
b6 AVERAGE MD TENURE + b7 GROUP/IPA

RESULTS

I tested Hypothesis 1, that greater difficulty in the transfer of specific information leads to more combined decision management (initiation and implementation) and decision control (ratification and monitoring) by comparing the levels of preauthorization (a measure of ratification) and profiling (a measure of monitoring) between single specialty and multispecialty groups (a measure of the difficulty of information transfer). Organizations in which decision management and control are combined do not utilize preauthorization *or* profiling mechanisms, hence the use of *RATMON*, which measures the use of preauthorization and/or monitoring. Higher values of *RATMON* indicate that the organization separates decision management and control by utilizing either or both preauthorization and profiling programs. Table 3.4 refutes Hypothesis 1 (while Tables 3.4-3.6 present the results of t-tests, results are also robust to non-parametric Wilcoxon rank sum tests).

Single specialty groups exhibit statistically significant lower values of *RATMON*, indicating significantly *less* separation between decision management and control. These single specialty organizations, in which information is more easily exchanged than in multispecialty organizations, thus evidence *more* combined decision management and control than do multispecialty organizations (the opposite of Hypothesis 1's prediction).

TABLE 3.4: T-TEST FOR DIFFERENCES IN USE OF PREAUTHORIZATION AND/OR PROFILING BETWEEN SINGLE AND MULTISPECIALTY GROUPS

SPECIALTY	N	PRE-AUTHORIZATION &/OR PROFILING (RATMON)	PRE-AUTHORIZATION	PROFILING
SINGLE	133	1.03*	4.04†	3.57*
MULTI	40	1.30*	2.77†	5.74*

* The difference between these means is statistically significant ($p \leq .05$) using a two-tailed test, not assuming equal variances. † The difference between these means is *not* statistically significant ($p \geq .10$), using a two-tailed test, not assuming equal variances. N=Number of organizations.

The last two columns of Table 3.4 present additional evidence regarding Hypothesis 1. Looking at the differences in the use of preauthorization and profiling *separately* (rather than in the combined measure of *RATMON*), it appears that the statistically significant difference in *RATMON* between single and multispecialty groups is attributable primarily to the different levels of profiling that characterize single and multispecialty groups. Column 4 of Table 3.4 suggests that single and multispecialty groups do not differ significantly in their use of preauthorization (although single specialty organizations appear to require more preauthorization, in support of Hypothesis 1, this difference is not statistically significant) while the last column of Table 3.4 suggests that single and multispecialty *do* differ significantly in their use of profiling. In contrast to Hypothesis 1, multispecialty groups, in which it is more difficult to transfer information, separate the management of decisions from their control.

TABLE 3.5: T- TEST FOR DIFFERENCES IN THE OWNERSHIP STRUCTURES AND SIZE OF ORGANIZATIONS WITH SEPARATE AND COMBINED DECISION MANAGEMENT AND CONTROL

DECISION MANAGEMENT AND CONTROL:	N	% of MDs WHO ARE OWNERS	N	ORGANIZATION SIZE (# OF MDs)
SEPARATE (use either or both preauthorization or profiling: RATMON>0)	55	57%*	56	245.30**
COMBINED (use neither preauthorization or profiling: RATMON=0)	112	69%*	113	34.89**
WITH PREAUTHORIZATION	113	61%†	113	143.42***
WITHOUT PREAUTHORIZATION	57	69%†	56	26.32***
WITH PROFILING	74	57%*	73	202.21***
WITHOUT PROFILING	97	68%*	97	34.73***

* The difference between these means is statistically significant ($p \leq .05$) using a two-tailed test, not assuming equal variances. ** The difference between these means is statistically significant ($p \leq .01$) using a two-tailed test, not assuming equal variances. ***The difference between these means is statistically significant ($p \leq .005$), using a two-tailed test, not assuming equal variances. † The difference between these means is *not* statistically significant ($p \geq .10$), using a two-tailed test, not assuming equal variances. N=Number of organizations.

For Hypothesis 2, that the combination of decision management and control leads to the restriction of residual claims, I tested for differences in the ownership structures between organizations utilizing separate and combined decision management and control. Again, separate decision management and control is indicated by the use of preauthorization and/or profiling. Table 3.5 offers some support for Hypothesis 2.

Organizations which combined decision management and control in individual physicians also made significantly more of those physicians owners than did organizations in which decision management and control were separate. Table 3.5 offers further evidence in favor of Hypothesis 2, looking separately at preauthorization and profiling. While the difference in ownership structure between organizations which used preauthorization requirement and those which did not was not significant, organizations which did not use preauthorization allocated ownership to a greater percentage of their physicians. Differences in the ownership structure of organizations which profiled or did not profile their physicians were statistically significant, and organizations without profiling allocated ownership to a greater percentage of their physicians.

I tested Hypothesis 3, that organizations with combined decision management and control are smaller than those in which these functions are separate, by comparing the mean size of organizations in which decision management and control was separated or combined. Table 3.5 also offers support in favor of Hypothesis 3: organizations with combined decision management and control were significantly smaller than those with separate decision management and control. Table 3.5 also demonstrates that analyzing preauthorization and profiling separately, organizations which utilized either mechanism (evidence of separate decision management and control) were significantly larger than organizations which utilized neither (evidence of combined decision management and control).

Finally, I tested Hypothesis 4, that the separation of residual risk-bearing and decision-making leads to decision systems that separate decision management from

control by examining the differences in decision systems between organizations with high (at and above the median) levels of owner-MDs and organizations with low (below the median) levels of owner-MDs.

Table 3.6 does not offer support for Hypothesis 4, as organizations with high and low levels of ownership among member physicians do not exhibit statistically significant differences in the separation or combination of decision management and control (as measured by RATMON). Similarly, Table 3.6 suggests that organizations with breadth of ownership (and thus combined risk-bearing and decision-making) across member MDs do not differ significantly in their use of profiling from organizations which have less breadth in ownership (and thus separation in risk-bearing and decision-making). Table 3.6 also suggests that organizations with greater breadth of ownership engage in

TABLE 3.6: T- TEST FOR DIFFERENCES IN THE SEPARATION OR COMBINATION OF DECISION MANAGEMENT AND CONTROL BETWEEN ORGANIZATIONS WITH HIGH AND LOW PERCENTAGES OF MDS WHO ARE OWNERS

% MDs WHO ARE OWNERS	N	PRE-AUTHORIZATION & PROFILING (RATMON)	N	PRE-AUTHORIZATION	N	PROFILING
≥ 73% (AT OR ABOVE MEDIAN)	86	1.02†	86	4.80*	85	3.59†
< 73% (BELOW MEDIAN)	81	1.16†	79	2.72*	81	4.48†

* The difference between these means is statistically significant ($p \leq .05$), using a two-tailed test, not assuming equal variances. † The difference between these means is *not* statistically significant ($p \geq .10$), using a two-tailed test, not assuming equal variances. N=Number of organizations.

significantly *more* preauthorization, in contrast to Hypothesis 4. Given that the t-tests and Wilcoxon tests offer mixed evidence in relation to the hypotheses (supporting H2 and H3 but discounting H1 and H4), and Klein's (1983) critique of Fama & Jensen for neglecting the true importance of organizational size effects, I also present results of a multivariate analysis of the relationship between the steps of the decision process and ownership (H2) in which the dependent variable is MD ownership in Table 3.7. Support for agency theory's hypotheses requires negative and statistically significant coefficients for the independent variables preauthorization (measuring ratification) and profiling (measuring monitoring): if groups do not combine decision management and control, there is no need to restrict ownership. Additionally, the coefficients on the control variables # of MDs, MDs per site, single specialty/multispecialty organization (multispecialty=1), and traditional group/IPA organization (IPA=1) should be positive and significant, while that on average tenure should be negative.

Model 1 includes organization size [LN(# of MDs)], while Model 2 does not. Given the skewed distribution of the dependent variable, ownership (45 of the 175 responding organizations reported that 100% of the physicians in the group were owners resulting in a spike at 100%), I repeatedly selected 10 random observations from the 100% response and used them in conjunction with observations from the rest of the distribution to approximate a normal distribution. Repeated runs of the models did not evidence significant differences in the results across random selections from this response category (utilizing Chow tests, $p > .10$). Both models are statistically significant, suggesting that several of the independent variables account for variation in

the dependent variable, ownership. The key variables are not, however, those highlighted by Fama & Jensen (1983a), preauthorization (measuring ratification) and profile (measuring monitoring), which describe the separation of decision management and control. Instead, Model 1 suggests that organization size (# of MDs) is the only statistically significant predictor of ownership arrangements and that size is negatively related to the dependent variable, the percentage of physicians in the group who are owners. Given the relationship between organization size (# of MDs) and the number of

TABLE 3.7: REGRESSION MODEL OF THE RELATIONSHIP BETWEEN OWNERSHIP STRUCTURE, PREAUTHORIZATION, AND PROFILING

	Model 1	Model 2
Dependent Variable:	*% MDs WHO ARE OWNERS*	*% MDs WHO ARE OWNERS*
Regression Coefficients and Standard Errors		
INTERCEPT	.711***	.503***
	(.092)	(.078)
PREAUTHORIZATION	.005	.006
	(.004)	(.004)
PROFILING	-.000	-.003
	(.005)	(.005)
LN(# OF MDs)	-.080***	
	(.021)	
LN(MDs PER SITE)	-.011	-.041*
	(.026)	(.025)
SPECIALTY	-.044	-.006
	(.065)	(.067)
AVERAGE MD TENURE	.009	.014***
	(.005)	(.005)
MG OR IPA	-.057	-.205**
	(.084)	(.078)
R^2	.284	.194
F	6.453***	4.614***

Coefficients: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; Standard errors in parentheses. N=125.

physicians per site (MDs per site) Model 2 excludes organization size (# of MDs). [13] When organization size is left out of the equation, the number of MDs per site, average MD tenure, and medical group or IPA organization are statistically significant predictors of ownership arrangements. Fama & Jensen's focus on the differential costs of separating decision management and control in organizations dependent on specific information suggests instead the importance of specialty as an explanatory variable. The number of MDs per site is an alternative measure of organization size, and it is also negatively related to the dependent variable. The coefficient on average MD tenure is positive, suggesting that while monitoring is presumably easier in groups in which physicians have worked together for a longer period of time, groups with longer tenure use more ownership. The coefficient on medical group or IPA organization is negative, suggesting that organizations with greater monitoring costs use less ownership rather than more.

DISCUSSION

While the results suggest some truth to Fama & Jensen's hypotheses, they also suggest that the relationship between ownership structure and the allocation of steps in the decision process may not depend on the factors they emphasize. Tests of mean differences for Hypotheses 1 and 3 suggest that the costliness of information transfer is not the key determinant of the combination of decision management and control. Organizations in which information transfer is relatively more difficult (multispecialty organizations) appear to combine decision management and control less rather than more.

[13] While their correlation is relatively low (r=.32), the two variables are relatively similar measures of

Multispecialty organizations also tend to be larger organizations, however, and the results for Hypothesis 3 suggest that it is simply small organizations that combine decision management and control. The statistical significance of size in the multivariate analysis of Hypothesis 2 further supports the influence of organizational size on the relative combination of decision management and control. While Model 2 suggests that apart from size, average tenure and organizational form have some effect on the allocation of decision management and control, interactions between these variables and size did not obtain statistical significance. Organizations in which physicians have longer tenure tend to be older organizations, and small organizations are the historical norm in this industry (Starr, 1982). IPAs tend to be larger organizations. The means test of Hypothesis 3 offers further evidence that organizations that combine decision management and control are smaller, while the means test of Hypothesis 4 discounts an alternative basis for the separation of decision management and control: the separation of risk-bearing and decision-making.

These results point to Klein's (1983) empirical observation that "the separation of residual claimant and management appears to be positively related to the size of the organization." (p. 371). Rather than focusing on the differential costs of separating decision management from control in noncomplex and complex organizations, Klein suggests concentrating on the incentive problems inherent in organizations with very large numbers of decision-makers. In these large organizations, individual owner-managers receive only a small share of any change in the firm's wealth produced by their

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monitoring difficulty.

decisions. The incentive effects of ownership are thus diluted. Klein hypothesizes that large organizations solve this incentive problem through the use of alternate governance mechanisms, including the ratification and monitoring mechanisms addressed here. The results of the means tests and multivariate analysis, suggesting significantly greater use of these alternative mechanisms in larger organizations, rather than in organizations subject to greater difficulty in the transfer of information, offer support for Klein's hypothesis. Thus, while the results do not support all of Fama & Jensen's (1983a&b) hypotheses about professional organizations, their failure to do so perhaps stems from agency problems not emphasized by Fama & Jensen, rather than because agency theory does not apply to professional organizations (Sharma, 1997).

As physician practices and other professional organizations increase in size, the need for these alternative arrangements will grow. Restricting the ownership of large physician organizations to physicians cannot insure that even owner-physicians will act in the best interests of all owners, given the likely small share of their decisions' wealth effects they will bear. Given the limited ability of patients to choose which physicians they see, such restrictions additionally do not insure patient-centered medicine.[14] The success of medical groups depends not on their ability to attract and keep patients, but rather on their ability to meet the demands of the insurers with whom they contract, and through them, employers. Rather than inducing accountability for clinical decisions, ownership restrictions on physician organizations instead restrict the equity sources, management talent, and clinical skill available to them by requiring physicians to be risk-

bearers and administrative and clinical decision-makers. Perhaps better monitoring, and hence the separation of decision management and control, rather than restricted ownership, is the answer. The rise of management service organizations (MSOs) and physician practice management companies (PPMs)—providing management, monitoring, and capital to physician organizations—suggests that the market thinks so. Consumer' demands for legislated care standards--minimum-stay requirements for new mothers and for women recovering from lymph-node dissections and mastectomies—suggest that patients do too.

The performance implications of different combinations of ownership and monitoring structures are not reported upon here. Several studies have examined the effects of managerial ownership on firm performance (Morck, Vishny & Schleiffer, 1988; McConnell & Servaes, 1990; Hermalin & Weisbach,1991) and found the relationship to be non-monotonic—while some managerial ownership aids firm performance, too much hurts it. Somewhat similarly, Hubbard & Palia (1995) found managerial ownership to be non-monotonically related to non-principal-directed behavior (overbidding on acquisitions). Perhaps professional decision-making in organizations provides another scenario in which to examine non-principal-aligned behavior. In the case of physician organizations, patient treatment decisions provide a key opportunity for expressing non-firm-value-maximizing preferences, as instead of economizing, physicians are able to instead invoke their treatment preferences given training, their level of comfort with the diagnosis they have made and each of the available treatment

[14] Physician ownership of medical practice never insured patient-centered medicine: while consumers had

options, and the degree to which they allow patient preference to dictate treatment plans. On-the-job amenities consumed by physicians include patient satisfaction and successful treatment. Firm-interested, physician-interested, and patient-interested behavior might not always be exclusive alternatives, but there are certainly circumstances in which they are. Investigating physicians' choices under these circumstances would provide empirical evidence relevant both to general discussions of the effects of various governance arrangements, and to the more immediate questions surrounding physician behavior under alternative compensation, ownership, and monitoring structures.

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greater ability to reward good physicians and punish bad ones by choosing the former, they had less information about the identity of either.

CHAPTER 4: RISK, RISK-SHARING, AND ORGANIZATIONAL SIZE: THEORY AND EVIDENCE IN PROFESSIONAL ORGANIZATIONS

The recognition that organizations, characterized as they are by imperfect information, need to negotiate between sharing risk and providing efficient incentives is considered one of contemporary economic theory's primary contributions (Gaynor & Gertler, 1995). Organizations share risk by sharing output across organizational members. The more organizational members share output, however, the stronger the incentive to shirk they face. Formed at least in part to share the risks of individual professional practice, professional organizations serve as a common empirical arena in which to study the determinants of risk-sharing and incentive provision (Gaynor & Gertler, 1995; Lang & Gordon, 1995; Kralewski, 1996).[1] While reasoning that professionals join organizations to reduce individual risk, this empirical research does not examine the relationship between organizational risk and risk-sharing arrangements. The empirical literature also offers conflicting evidence about the alternative determinants of risk-sharing arrangements. Utilizing agency theory, I propose a relationship between organizational risk and risk-sharing arrangements, compare it to previous empirical results, generate a proposed relationship between organizational size and risk-sharing arrangements, and test both hypotheses utilizing recent data on insurer-contracted medical groups. A better understanding of risk-sharing and incentive provision in professional organizations would significantly improve our knowledge of organizational governance structures, and potentially enlighten our understanding of the delivery of professional services.

[1] Gaynor and Gertler call professional organizations "a classic example of the tradeoff between risk-spreading and moral hazard [the result of imperfect incentives]" (1995: 591).

BACKGROUND

Agency theory, risk, and risk-sharing arrangements

Agency theory attributes the development of organizational structures to their ability to deal with the ubiquitous organizational relationship in which one or more persons (the principal(s)) engage other person(s) (the agent(s)) to perform some service on their behalf, thus delegating some decision-making authority, but not all of the risk associated with that decision-making authority, to the agent (Ross, 1973; Jensen & Meckling, 1976). Governance structures arise to meet principals' (risk-bearers') demands for efficient coordination and control of agents (decision-makers) (Fama & Jensen, 1983a&b). Incentive and monitoring mechanisms limit strictly self-serving behavior among decision-makers, and encourage behaviors aligned with the collective interest of organizational risk-bearers, or owners (Jensen & Meckling, 1976).

Researchers identify two streams of agency theory (Jensen, 1983: Eisenhardt, 1989; Beatty & Zajac, 1994; Zajac & Westphal, 1994). Organizational theorists generally rely on the positive, empirically based, agency theory (Eisenhardt, 1989; Beatty & Zajac, 1994) which focuses primarily on the separation of corporate ownership and control and the role of monitoring mechanisms such as boards of directors (Berle & Means 1932; Jensen & Meckling, 1976; Fama, 1980; Fama & Jensen, 1983a&b; for reviews, see Eisenhardt, 1989; Beatty & Zajac, 1994; for an exception see Beatty & Zajac, 1994). Researchers who have recognized the relevance of agency theory to professional, specifically health care, organizations also focus on this stream of literature (Hillman et al., 1989, 1992; Flood & Fennel 1995; Dranove & White, 1990; Gaynor & Pauly, 1990;

Salmon, White & Feinglass, 1990; for an exception see Gaynor & Gertler, 1996). This positive agency theory, and the organizational research based upon it, places much of its emphasis on the importance of pay-for-performance linkages (Ross, 1973; Jensen & Murphy, 1990).

Normative agency theory, on the other hand, recognizes the potential disadvantages of excessive risk-bearing by decision-makers and suggests that organizations must balance incentive, monitoring, and risk-bearing arrangements in seeking to ensure appropriate decision-maker behavior (Spence & Zeckhauser, 1971; Stiglitz, 1975; for reviews, see Levinthal, 1988; Beatty & Zajac, 1994). Agency theorists focus on riskiness in economic returns, and risk describes a context in which probabilities can be assigned to outcomes, given experience (Knight, 1921; Demsetz, 1995). Individual risk is that associated only with an individual agent's performance, while organizational risk is that associated with the performance of the organization as a whole--the combination of individual organizational participants' performance—and this risk is shared across individual agents.

Like other agents, professionals are risk averse, but for professionals, it is the risk associated with significant investments in their human capital that is of key importance (Lang & Gordon, 1995; Gaynor & Gertler, 1995). Professionals' investments in human capital remain risky given the lack of a capital market in which to sell this asset, and the limited availability of insurance for this asset (Lang & Gordon, 1995; Gaynor & Gertler, 1995). While the former is limited by the impossibility of and injunctions against such a sale, the latter is limited by the extreme monitoring difficulties faced by outside insurers

given the unobservable nature of professional effort. Life and disability insurance provide some human capital insurance—but Lang & Gordon (1995) cite the expense of the latter in particular as evidence of the severity of moral hazard and adverse selection problems (also see Gaynor & Gertler, 1995).

Professionals may insure themselves against idiosyncratic shocks to their human capital (including shifts in demand for their medical specialty, fee-collection difficulties, and reputation problems) by joining together in organizations in which they share risk with other professionals (making it organizational rather than individual risk) and can presumably monitor each other better than can outside insurers. Given the risk-sharing advantages of placing individual professionals at risk only for the performance of the organization as a whole, it is particularly costly for the organization instead to put professionals at risk for their own individual performance (Shavell, 1979; Stiglitz, 1985; Holmstrom, 1987; Milgrom & Roberts, 1992). Not placing professionals at risk for their own individual performance is costly also, however, for the risk of returns to their individual performance provides professionals with incentives to maximize the value of their individual marginal effort. Risk-sharing denies professionals the full value of their individual marginal effort and thus encourages shirking. Organizations consequently provide incentives to professionals (and other decision-makers more generally) at the cost of putting those professionals at risk. Organizations trade between the costs of weak incentives and the costs of putting decision-makers at risk. Weak incentives have none of the costs associated with putting decision-makers at risk, while putting decision-makers at risk has none of the costs of weak incentives.

Incentive and monitoring arrangements provide the instrument through which organizations put decision-makers at risk, providing incentives at the cost of placing decision-makers at risk for their own individual performance, or share risk across decision-makers by putting them at risk for the organization's performance. Sharing risk alleviates the costs of making decision-makers bear risk, but at the cost of weak incentives.

When organizational risk is particularly high, placing decision-makers at risk for their individual performance is particularly costly relative to the cost of not providing incentives. Placing organizational professionals at risk for their own individual performance decomposes organizational risk into its individual risk components. While providing individual professionals with incentives to maximize the value of their individual marginal effort, this transfer of risk to the individual is costly because given the reduced variance in expected returns provided when organizational risk is shared across individuals, the risk to which the individual is subjected under individual risk is greater than that he/she faces when organizational risk is shared across individuals.

Organizations subject to greater risk thus economize on the trade-off between risk and incentives by insulating individual decision-makers from risk—saving the costs of placing decision-makers at risk for their individual performance at the expense of weak incentives. These organizations share risk across individual decision-makers.

H1: Greater organizational risk will be positively associated with risk-sharing across individual decision-makers.

Hypothesis 1 should be particularly true in professional organizations, making them a useful arena in which to study the relationship between organizational risk and

incentive arrangements. Given the nature of professional work, professional organizations are characterized by a relatively higher degree of imperfect information about the level of effort expended by decision-makers than other kinds of organizations (Gaynor & Gertler, 1996). It is more difficult, for example, to evaluate the degree of thought a physician has invested in a particular patient's treatment plan than it is to evaluate how much effort a painter has put into painting a home (Alchian & Demsetz, 1972). Imperfect information compromises the effectiveness of incentives by making any basis for the provision of incentives problematic (Gaynor & Gertler, 1996). If the benefits of providing incentives in professional organizations are lower, then the relative costs of not providing them—the costs of insulating professionals from risk—are also lower, further supporting the bias against having individual decision-makers bear the risk of their own individual behavior or performance, as suggested by Hypothesis 1. In addition, the particularly significant investments professionals make in their human capital may make them less diversified and more risk averse than other contributors of human capital—further supporting the bias towards risk-sharing suggested by Hypothesis 1.

Previous empirical results

Rather than focusing on the relationship between organizational risk and risk-sharing arrangements specified by Hypothesis 1, several recent empirical studies of professional organizations have instead identified a relationship between organizational size and organizational risk-sharing arrangements. While not explicitly examining the relationship between organizational risk and risk-sharing arrangements, Kralewski et al.'s (1996) examination of 45 Minnesota medical groups found no relationship between the

proportion of organizational revenue derived from capitation and organizations' physician compensation arrangements.[2] Instead, Kralewski et al. (1996) found organizational size to be significantly negatively associated with salaried physician compensation (categorized within my methodological framework as risk-sharing compensation). Larger organizations tended to pay their physicians on a fee-for-service (not risk-sharing) rather than on a salary (risk-sharing) basis.

Similarly, Lang & Gordon (1995) point to the importance of the relationship between organizational size and risk-sharing, but explicitly hypothesize and confirm (using data on 329 legal practice partners) a theoretical relationship opposite to Kralewski et al.'s (1996) empirical result: that increased organizational size leads to greater risk-sharing. They infer each practice's degree of risk-sharing from the relationship between partners' billable hours and income. Lang & Gordon's (1995) theoretical intuition is that for any given sharing rule, as organizations get larger, the benefits of risk-sharing increase. That is, even with an equal sharing rule, little risk-sharing occurs in a practice of two physicians or lawyers—while in a practice of 50 professionals, an equal sharing rule induces a great deal of risk-sharing. Lang & Gordon (1995) assume, however, that shirking inefficiencies due to sharing are independent of the number of partners: partners choose effort (non-shirking) levels in order to maximize their utility function subject to the organization's rule for distributing profits. The organization's rule for distributing profits is structured so that

[2] I utilize capitation revenue as a measure of organizational risk (see the Methods section of this paper for greater detail), while Kralewski's compensation measure is similar to the one I use to measure risk-sharing. Kralewski, however, categorizes physician compensation as either salary or fee-for-service,

each partner keeps a fraction α of the profits he generates, and gives the fraction $(1-\alpha)$ to the rest of the partners to share among them. Since the number of other partners does not affect α, the only portion of the profits each partner generates to which he is entitled, partners choose effort levels independent of the number of other partners, or size of the organization. Each partner does not care how many other partners split $(1-\alpha)$, since he is not entitled to any of it. Given increasing benefits (risk-sharing) and independent costs (shirking), larger organizations should share risk more. While relevant here given Lang & Gordon's focus on the relationship between organizational size and risk-sharing, their neglect of potentially increased shirking given increased size may explain the difference between their and Kralewski's results.

Alternative incentive schemes (in which, for example, the fraction $(1-\alpha)$ might be shared across *all*, not just *other*, partners, making organizational size a determinant of how much each partner received back from his $(1-\alpha)$), might induce greater shirking in larger groups, thus suggesting larger organizations might share risk less (as found by Kralewski et al.) rather than more (as Lang & Gordon found). Klein (1983) describes the incentive problems inherent in organizations with very large numbers of decision-makers. In large organizations, individual risk-sharers receive only a very small share of any change in the firm's wealth produced by their decisions. The dilution of incentives caused by risk-sharing is thus particularly severe. In addition, individual decision-makers in large organizations remain less able to identify the contribution of colleagues than decision-

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while my measure of risk-sharing categorizes compensation more broadly as individual-performance or organizational-performance contingent (see the Methods section for greater detail).

makers in small organizations. Larger organizations thus may experience increased difficulty in identifying shirkers—further suggesting that inefficiencies due to shirking may increase with organizational size, and thus that larger organizations might share risk less than smaller ones. Monitoring may act as a substitute for incentive provision, making risk-sharing relatively less costly in small organizations (in which monitoring is less costly than is large organizations) than in large ones (see Chapter 2).

Gaynor & Gertler's (1996) results support concern for the possibility of increased shirking in larger organizations. Focusing on the relationship between risk-aversion and risk-sharing in 415 medical groups, Gaynor & Gertler find that while more risk-averse medical groups share risk to a greater degree, they also keep their organizations small.[3] They interpret these results as indicating that while more risk averse groups share more risk, they mitigate the shirking induced by revenue sharing by keeping their organizations small. They do not indicate whether this mitigation comes from the lesser incentive dilution or better monitoring ability present in smaller as opposed to larger organizations.

Following Gaynor & Gertler's (1995) emphasis on the potential for increased shirking in larger organizations (and Kralewski et al.'s (1996) empirical result) rather than Lang & Gordon's assumption that shirking is independent of organizational size, I propose the following hypothesis.

H2: Greater organizational size will be negatively associated with risk-sharing across individual decision-makers.

[3]While measures of risk aversion typically remain unavailable, Gaynor & Gertler (1995) average self-report survey data on individual physicians' tolerance for fluctuation in income (ranging between 0 and 4) and utilize organizational averages (all physicians belonging to the medical group) in their analysis.

Empirical support for Hypothesis 2 would uphold Gaynor & Gertler's (1995) approach to the relationship between organizational size and risk-sharing and both Gaynor & Gertler's and Kralewski et al.'s empirical results, while an empirical result suggesting that organizational size is positively related to risk-sharing would support Lang & Gordon's (1995) approach and empirical results.

METHOD

Medical group population

Similar to Kralewski et al. (1996) and Gaynor & Gertler (1995), I examine the relationship between organizational risk and risk-sharing arrangements in the context of insurer-contracted medical groups. Gaynor & Gertler (1995) describe medical groups as the classic example of the tradeoff between risk-sharing and incentive provision, suggesting that these organizations constitute an excellent arena in which to study the relationship between organizational risk and risk-sharing arrangements. While Gaynor & Gertler (1995) examine medical groups from 1978, the growing predominance of capitated contracts between insurers and medical groups—contracts that are particularly risky to profits—reflected in the more contemporary organizations analyzed below make them an exceptionally useful arena in which to examine risk and risk-sharing relationships. The organizations analyzed here are thus more comparable to Kralewski et al.'s (1995) 1992 organizations than they are to Gaynor & Gertler's (1995), although more organizations are analyzed here than in Kralewski et al.'s study (N=175 here vs. Kralewski et al.'s N=45).

Examining medical groups' governance reactions to capitated contracts has policy as well as management implications. The providers of health care for indemnity insurers and increasingly of managed care services through network-model insurers (providing care to 69% of those enrolled in HMOs in the United States--see Hoechst Marion Roussel, 1997), medical groups remain relatively unexplained organizational forms (Kerr et al., 1995; Gold et al., 1995 a&b).[4] These organizations provide care under contract with multiple insurers, in which each insurer contracts with multiple medical groups to provide care for the insurer's enrollees, and each medical group in turn contracts with multiple insurers (see network model insurers in Figure 2.2) (Kerr et al., 1995; Gold et al., 1995 a&b; Robinson & Casalino, 1995 & 1996). Hillman et al. (1992: 137) refer to these arrangements as "three-tiered", in which the insurer constitutes the first tier, the medical group comprises the second tier, and member physicians make up the third tier (see Figure 2.3). Contracts between insurers and medical groups are characterized by either fee-for-service compensation or capitation. Fee-for-service compensation provides the medical group with a payment *for every service* they provide to the contracting insurer's enrollees. Under capitation, the medical group instead receives a payment *for every enrollee*, every month, from which the medical group is meant to cover the cost of all services provided to that enrollee. The medical group pools these capitated payments, and essentially pay for

[4] Until recently, staff- and group- model health maintenance organizations (HMOs) provided the vast majority of managed care services. In these HMOs, physicians (referred to as MDs in the tables) are either employees of the HMO (in the case of the staff-model HMO), or are employed by a large medical group that contracts exclusively with a single HMO (in the case of the group-model HMO). Physicians employed by these two types of organizations care only for patients enrolled in the single HMO for which the physician works or with which the physician's medical group contracts. See Figure 2.2 for a comparison of insurer forms.

all care from a central fund. Thus, while the total costs of care for a particular patient(s) may exceed the sum of the payments provided by the insurer for that patient's (patients') care, those costs are paid out of the insurer's payments for patients whose total care costs are less than those payments. The medical group retains the difference between the cost of the services they provide and the capitated payments, but they also accept financial risk for any costs of enrollees' care that exceed the sum of these payments.

Although these medical groups contract with insurers to provide care for the insurers' enrollees, control over their own internal governance mechanisms remains with the groups (Hillman, Welch, & Pauly, 1992; Kerr et al., 1995). Groups retain control over the incentives they provide to their physicians, and how they design monitoring mechanisms internal to the group (although contracting insurers usually require some basic monitoring mechanisms without detailing their structure) (Hillman et al., 1992; Kerr et al., 1995). Recent empirical examinations of medical groups, however, remain descriptive and have yet to systematically assess these organizations' consistency with theories of organizational governance (Kralewski et al., 1996; Trauner & Chesnut, 1996; Conrad et al., 1996).[5] Beyond knowing that the development of governance arrangements remains within the medical groups' purview, researchers know relatively little about these mechanisms:

> The middle level of a managed care organization in three-tiered arrangements [in which the insurer constitutes the top tier, the medical group comprises the middle tier, and member physicians make up the bottom tier] is an important feature that is not well understood...few studies detail the organizational form of [this] middle level, its functions and how it

[5] Also see Hillman, Welch & Pauly, 1992; Gaynor, 1994; Kerr et al., 1995; Gold et al., 1995 a&b; and Robinson & Casalino, 1995 & 1996.

> modifies....the directness of the relationship between managed care plans and physicians. (Gold et al., 1995a: 321; see also Figure 2.3).

Meanwhile, concern continues to grow about the rise of capitated contracts and the use of innovative incentive and monitoring arrangements by medical groups (Starr, 1982; Salmon, White & Feinglass, 1990; Woolhandler & Himmelstein, 1995; also see reactions to Woolhandler & Himmelstein, 1996). Understanding the governance structures of medical groups would significantly improve our ability to evaluate the implications of these structures for health care delivery. Many health services researchers recognize agency theory's relevance to the organization of health care, but systematic tests of the theory's empirical implications in the modern health care sector remain limited (for agency theoretic discussions, see Dranove & White, 1987; Salmon, White & Feinglass, 1990; Pontes, 1995; Gaynor, 1997; for empirical exceptions see Gaynor & Gertler, 1996).

The sample

Detailed data on the governance mechanisms utilized by these medical groups come from a recent survey-based study of medical groups conducted by the author.[6] A sample of 1,000 California medical groups was selected from a population of 1,954 medical groups in California using a stratified random sampling method. The population was identified by combining directories of California medical group practices from the American Medical Association[7], the American Group Practice Association (now part of

[6] Tosi, Katz, & Gomez-Mejia (1997) suggest the use of traditional organizational science methodologies, including both laboratory studies and survey research, as a potentially more fruitful avenue for understanding the relationship between incentives and monitors complement than the archival economic and demographic data generally used.

[7] The American Medical Association's group directory is produced from their annual survey of individual practitioners, in which they ask those respondents who are medical group members for the name and

the American Medical Group Association), and the Medical Group Management Association[8], and by combing trade publications for names of existing medical groups. Faculty practice and group HMO medical groups (i.e., Kaiser Permanente Medical Group) were not included in the sample given their differences from the network-model-insurer contracted medical groups under focus. Given the skewed distribution of the population, large groups (those over the population's median size of 7) were targeted to insure that some responses would come from large practices (in which agency problems were expected to be greater).

The survey

The 25-page survey was based on an agency theoretic model of the incentive and monitoring mechanisms specific to medical groups. These mechanisms were identified by reviewing the literature on physician compensation, medical group ownership structure, and the physician monitoring techniques included under the general rubric of utilization management. Additionally, as part of this and several other related studies, the author conducted 120 exploratory, semi-structured interviews with medical directors, other key medical group administrators, and physicians in 17 managed care settings in 4 states: California (11 organizations), Texas (3 organizations), Minnesota (1 organization), and Maryland (2 organizations). A pilot test of the survey instrument was administered to 15 medical directors in California, 3 of whom agreed to serve on the project's advisory panel

address of the medical group with which they practice. Their survey is not limited to American Medical Association members.

and provide additional comment. Finally, executives in 3 medical group management associations: the Medical Group Management Association (MGMA), the Independent Practice Assocation of America (IPAA) and the National Independent Practice Association Coalition (NIPAC) reviewed the survey instrument and provided input on its construction. The MGMA additionally provided a letter of support to be enclosed with each survey, while IPAA offered an endorsement mentioned in the survey's cover letter and an advertisement in their member newsletter encouraging participation. The cover letter also included references to the project's advisory panel and support from the VA/UCLA/RAND Center for the Study of Healthcare Provider Behavior and the UCLA Center for Health Services Management. The letter was signed by the physician directors of these two Centers, and by the author.

The survey was administered in several phases. Initially, all 1,000 organizations in the sample received the cover letter, MGMA letter, the survey, a brochure describing the study, and a self-addressed, postage-paid envelope. The survey packet was addressed to either the organization's medical director (these organizations' key physician executive) or, if no medical director existed, the organization's practice administrator (these organizations' key lay executive). These individuals were identified using the directories and other publications employed to identify the population (or by a telephone call if no other information was available). Two weeks later, non-respondents received a reminder post-card. Throughout the following month, non-respondents were telephoned randomly,

[8] The American Medical Group Association and the Medical Group Management Association are the two predominant medical group associations in the country. Both associations' directories are limited to their

and a randomly selected 750 of the initial 1,000 organizations received a second set of all survey materials with a revised cover letter at the end of that month. Randomly selected non-respondents continued to be telephoned throughout the next month, and a randomly selected 500 received another complete set of survey materials 6 weeks later. A randomly selected 250 of these 500 also received a $20 bill and a cover letter noting the gift's inclusion, but also asserting no obligation on the part of potential respondents. An additional postcard was sent to all non-respondents within this 500 organization subset 2 weeks later, and each organization received a telephone call. Two weeks later, a randomly selected 30 of the 250 organizations (within the 500 organization subset) which had not previously received the $20 gift received it, a complete survey packet, and a telephone call.

Of the original sample of 1,000 medical groups, 150 organizations were deleted from the sample population through random telephone follow-ups and directed telephone follow-ups of returned-to-sender survey packets. These organizations had either ceased to exist altogether or had been acquired by another organization already included in the sample. 175 organizations responded to the survey, representing a response rate of 21%. Response rates for each contact are included in Figure 2.4 (Figure 2.4's Ns are reported minus the 150 organizations that were eventually deleted). Response rates were demonstrably higher among those who received the $20 gift, but because these organizations were randomly selected, any related bias should be relatively inconsequential.

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members.

Representativeness

Responding organizations appear to be representative of the population in terms of size, specialty, and geographical location. Respondents indicated the size of their organization as the number of physician members and contractors included in the organization.[9] The AMA directory, AGPA directory, MGMA directory, and several trade publications provided information on the size of 1,081 of the organizations in the population (N=1,954). The median size of responding organizations was 10 physicians—not significantly different from the population (on which there was available data) median of 7 physicians ($p > .10$).[10]

Respondents also indicated whether theirs was a primary care, single specialty, or multi-specialty organization. 55% of the responding groups identified themselves as single specialty, 21% identified themselves as primary care groups, and 24% identified themselves as multi-specialty groups. Hence the mode of organization among respondents was single-specialty. I coded the medical specialty of each group in the population (N=1,954) utilizing information included in the AMA directory, AGPA directory, and MGMA directory, and in cases where this information was missing, using clues provided by the name of the medical group (Arlington Radiology Medical Group, for example, was coded as a single-specialty organization). 55% of the groups in the population were identified as single-specialty organizations, while 14% were identified as primary care

[9] Member physicians were defined for respondents as employees and/or partners whose primary or only employment was with the organization. Contractor physicians were defined as solo-practitioners, partners, and/or employees of another organization with whom the responding organization contracted to provide care to the responding organization's patients or enrollees.

organizations and 31% as multi-specialty organizations. Similar to respondents, the population's mode of organization was single-specialty. The proportion of responses from single-specialty organizations matched the proportion of the population that was single-specialty (55%), but primary care groups appear to be mildly over-represented among respondents (21% of the respondents were primary care while 14% of the population was primary care), while multi-specialty groups appear to be mildly under-represented (24% of the respondents were multi-specialty while 31% of the population was multi-specialty) (see Table 2.1).

These apparent differences may, however, be the result of inaccuracies in the population statistics. The AMA directory distinguished only between single-specialty and multi-specialty organizations, coding primary care organizations as multi-specialty organizations. I attempted to correct for the lack of identification of primary care groups and over-identification of multi-specialty groups by recoding family practice groups, general practice groups, internal medicine groups, *general* pediatric groups (pediatric subspecialty groups, including pediatric neurology, were coded as single specialty groups) and those organizations with "primary care" included in the title of the group as primary care groups, since each of these types of practices often provide primarily primary care services. The population statistics still probably underestimate the proportion of primary care groups and overestimate the proportion of multispecialty groups, however, suggesting that the relatively small differences between respondents and the population may not even be as large as those indicated by the available statistics.

[10] Given the left-skewed distribution of size, the median is more descriptive than the mean.

Finally, using postal service area 3-digit zipcodes, I compared respondents' zip-codes with those of organizations in the population. The proportion of respondents coming from each postal service area appears to be similar to the proportion of the population of organizations in each area (see Table 2.2).

Limiting the sample to a single type of organization within a single industry controls for the possibility that the costs and benefits of different governance mechanisms may vary systematically across types of organizations and among industries (Rediker & Seth, 1995). Similar to Rediker & Seth's (1995) 1982 data from the banking industry, the cross-sectional data utilized here also examine a particularly important time period in the focal industry, given extreme environmental change. Increasing pressure for cost reduction while providing quality care has intensified competition between medical groups and created an impetus for these organizations to modify their strategies and structures in an effort to compete successfully or simply to survive. The ongoing move from fee-for-service to capitated contracts considerably increases the economic risk associated with these organizations' activities. In the past, economic risk primarily lay in the organization's ability to attract patients and make them or their insurers pay for the services they were provided—once attracted, the organization was supposed to be paid for each and every service provided to the patient. Under capitation, organizations still risk attracting patients, and although insurers pay them a small payment regardless of whether any services are provided, the medical group is at risk instead for the cost of the actual level of service provided. Given the more complete patient insurance associated with health care plans in which the contract between insurer and medical group is

capitated, patients also presumably consume more services under capitated arrangements than under fee-for-service ones. This setting thus presents a unique opportunity to examine the risk-sharing properties of incentive arrangements in professional organizations.

Dependent variable

Incentives

I present descriptive statistics for all measures in Table 4.1, and a correlation matrix for all measures in Table 4.2. Compensation contracts specify the financial incentives to which physicians are subject, and whether the organization puts the risk of capitation on individual physicians, or whether they share that risk across the organization. I measure the dependent variable, the level of risk-sharing in physicians' compensation arrangements, as the percentage of physicians' compensation that shares risk across the organization. Medical groups reported physicians' compensation as a combination of salary, capitated payments, discounted fee-for service without withhold, discounted fee-for-service with withhold, full fee-for-service, full fee-for-service with withhold, individual-performance-based-bonus, organizational-performance-based-bonus, individual physician's withhold returns, pooled withhold and other risk pool returns, returns to ownership, non-cash benefits, equal share of pool, and individual-productivity-based share of pool.[11] Capitated payments, discounted fee-for-service and full-fee-for-service without withhold, individual performance-based bonus, individual physician's withhold returns,

[11] Lowes, 1997 provides a relevant discussion of pooling arrangements.

TABLE 4.1: DESCRIPTIVE STATISTICS (Means, Medians or Percentages*, Standard Deviations [S.D.], Minimums [Min.], and Maximums [Max.])

Dependent Variable:	Mean	Median or %*	S.D.	Min.	Max.
Incentives					
PERCENTAGE OF PHYSICIAN COMPENSATION THAT IS RISK-SHARING					
(in percentages)	60.13	79.07	41.51	0.00	31.03
(as 0/1, 1=risk-sharing)		87%			
(as 0/1/2) 0 = no risk sharing		14%			
1 = some risk sharing		46%			
2 = all risk sharing		40%			
Independent Variables:					
Risk					
PERCENTAGE OF PATIENTS UNDER CAPITATED CONTRACTS					
(in percentages)	31.38	19.00	34.63	0.00	100.00
(as 0/1/2) 0 = no capitation		26%			
1 = capitation		64%			
2 = all capitation		10%			
ORGANIZATION SIZE (# OF MDs)	106.65	9.50	339.90	3.00	3200.00
LN(# OF MDS)	2.80	2.30	1.73	1.10	9.50
Control variables:					
SPECIALTY (MULTI=1)		24%			
ORGANIZATIONAL FORM (MG=0, IPA=1)		14%			
FAMILIARITY (AVERAGE MD TENURE)	11.11	10.00	5.60	2.00	28.00
RESIDUAL CLAIMANTS (FOR=1)		93%			
ORGANIZATIONAL AGE (# YEARS)	18.46	16.00	13.68	1.00	73.00
LN (ORGANIZATIONAL AGE)	2.57	2.77	0.95	0.00	4.29
PERCENTAGE OF PHYSICIANS OVER AGE 45	52.06	50.00	24.68	0.00	100.00
CAPITATION EXPERIENCE (# OF YEARS)	4.00	2.00	4.80	0.00	25.00
SQUAREROOT(CAPITATION EXPERIENCE)	1.57	1.41	1.23	0.00	5.00
LEGAL FORM (RISK-SHARING=1)		82%			

* Percentages are reported for 0/1 indicator variables

TABLE 4.2: CORRELATION MATRIX FOR ALL VARIABLES

Variable	2	3	4	5	6	7	8	9	10	11
1. Risk-sharing compensation	-0.23	-0.16	-0.12	-0.22	0.17	0.02	0.10	0.15	-0.25	-0.02
2. % Capitation		0.15	0.31	0.50	-0.30	-0.05	-0.15	-0.04	0.65	0.04
3. Ln(#MDs)			0.07	0.10	-0.15	-0.02	-0.18	-0.01	0.08	0.09
4. Specialty				0.38	-0.29	-0.03	-0.19	-0.10	0.30	0.17
5. MG/IPA (IPA=1)					-0.25	.06	-.021	-0.08	0.24	0.17
6. Average MD tenure						0.14	0.35	0.40	-0.17	-0.09
7. Not/For-Profit (For=1)							0.11	0.07	-0.02	-0.08
8. Ln(Age)								0.01	0.11	.05
9. % of MDs over 45									-0.06	-0.07
10. Sqrt (Cap'n experience)										0.04
11. Legal form										-

and individual-productivity-based share of pool are compensation arrangements based only on the individual physician's performance, and thus subject individual physicians to risk not shared across the organization. Salary, discounted and full fee-for-service *with* withhold[12], organizational- performance-based-bonus, pooled withhold and other risk pool returns, returns to ownership, non-cash benefit, and equal share of pool all share risk across the organization, and were thus included in the risk-sharing compensation measure.

[12] Under withholding arrangements, a portion of the physicians' payment for services is generally withheld by the group until the end of the year, and then passed on to the physician or retained by the group depending on whether or not there is a deficit in the funds the group has allocated to pay for specialty referrals and inpatient care (see Gold, Nelson, Lake, Hurley, & Berenson, 1995 for variations.). If withhold were reported as pooled individually and thus returned only on the basis of the individual physician's output, they were included in the non-risk-sharing portion of compensation.

The percentage of risk-sharing compensation is equal to 100% minus non-risk-sharing compensation and vice-versa. The distributions of both compensation variables are skewed to the right--responding organizations tend to use compensation arrangements which share risk to some degree, rather than not sharing risk at all. To address this departure from a normal distribution, I created a categorical variable indicating whether the organization tended to pay its physicians wholly with risk-sharing compensation, with a combination of risk-sharing and non-risk-sharing compensation, or not with risk-sharing compensation at all (and hence placing all risk on individual physicians).

Independent variables

Risk measure

I measure organizational risk as the proportion of medical group revenues that come from capitated contracts with insurers. Capitated contracts, as financial instruments which shift risk from insurers to medical groups, increase medical groups' economic risk (see page . The proportion of medical group revenue that comes from capitation measures economic or return riskiness--the higher the percentage of patients covered by capitated contracts, *ceteris paribus*, the more the medical group subjects itself to the risk that patients' health care costs will be higher than the rates paid to the medical group to care for these patients.

Organizational size

I measure organizational size as the number of physicians in the organization. The size of these organizations ranged from 3 physicians to 3,200 physicians, and the distribution is highly skewed to the left, making the median of 10 physicians more

descriptive than the mean of 107. A physician organization reporting 13,410 physicians was left out of the analysis as an outlier, and a natural log transformation of this variable was used to normalize its distribution. As size increases, risk-sharing's incentives are increasingly diluted and monitoring becomes increasingly difficult as the likelihood of regular contact or consult between individual physicians falls.

Control variables

While previous empirical approaches have emphasized organizational size as a measure of increased monitoring difficulty (Gaynor & Gertler, 1995), I additionally measure the difficulty of monitoring through indicators for traditional group or independent practice association (IPA) organizational form, and for group "scope" (single specialty or multispecialty) (cf. Kralewski, Pitt & Shatin, 1985). As physicians' contact with each other and the diversity of their professional training, interests, and the services they offer increases, the ease of mutual monitoring falls. I control for organizational form (traditional group practice versus IPA), since these different structural arrangements might be expected to be associated with different degrees of monitoring difficulty (Kralewski, Pitt & Shatin, 1985; Shenkin, 1995). Traditional group practices, in which physicians share business and clinical facilities, records and personnel and often practice together at one site, offer greater opportunities for each group physician to monitor and consult with other group physicians, thus making monitoring easier. IPAs restrict such opportunities because although individual physicians or traditional group practices join an administrative body that negotiates the provision of their professional services to patients enrolled in managed care plans, individual physicians or traditional group practices maintain and see

patients in their own, individual private offices. IPA physicians are not in contact with, and thus have little opportunity to monitor other physicians who are also members of their IPA, unless they are members of the same traditional group practice.[13]

I measure organization scope as a dichotomous variable indicating whether the medical group included physicians from a single specialty or multiple specialties. In single specialty groups, all physicians have similar training and knowledge, and monitor each other more easily than can physicians in multi-specialty groups, in which physicians come from a range of specialties and thus have different training, knowledge, and experience. Single specialty organizations included, for example, cardiology groups, (in which all physicians were cardiologists), urology groups (in which all physicians were urologists) and primary care groups (in which all physicians were primary care physicians). Seventy-six percent of the physician organizations examined here were single specialty organizations, while twenty-four percent were multispecialty organizations. Agency theory suggests that the more difficult it is for professionals to monitor each other, the greater the costs of not providing incentives. Greater difficulty in monitoring should thus be negatively related to the use of risk-sharing compensation arrangements. As indicators of increased monitoring difficulty, organization size, traditional group versus IPA organization (IPA=1) and organization scope (multispecialty=1) should be negatively related to risk-sharing compensation.

[13] cf. Wholey, Christianson, & Sanchez, 1992 who similarly distinguish between group- and IPA-model HMOs, suggesting that physicians in group HMOs have more and stronger social and instrumental attachments to the HMO than do physicians in IPA HMOs.

Conversely, ease of monitoring reduces the expense of not using incentives, and thus should be positively related to the use of risk-sharing compensation arrangements. I measure ease of monitoring with the average tenure of physicians and the presence of residual claimants. The average tenure of physicians should be positively related to the use of risk-sharing compensation: physicians with longer histories of working together, and thus greater familiarity with each other's practice styles, can more easily monitor one another. I address the existence of residual claimants through an indicator for for-profit organization. Agency theory suggests that given the propensity of residual claimants to act as monitors, for-profit organization should be positively related to risk-sharing compensation.

Agency theory additionally suggests the importance of several other organizational factors in determining the structure of organizational governance arrangements. Agency theory also points to the importance of group age in the choice of compensation arrangements. Agency theorists focus on the costs of governance structure change. Older medical groups are more likely than younger medical groups to have begun as small partnerships in which physicians shared risk. Moving towards an organizational structure in which physicians are subjected to non-risk-sharing compensation might involve significantly greater costs than starting out with these structures. Group age should thus be positively related to risk-sharing compensation arrangements. The natural log transformation of this variable was used to normalize its skewed distribution. I also utilized a measure of the age of the relevant decision-makers (the percentage of physicians over age 45). Agency theorists argue that older physicians may be less sensitive to

discipline from the managerial labor market (an external control mechanism) (Beatty & Zajac, 1994), and hence make risk-sharing compensation relatively more expensive. Agency theory thus suggests a negative relationship between the age of organizational physicians and risk-sharing compensation.

The organization's experience with risk may also affect its use of risk-sharing compensation. Agency theory suggests that the greater experience with risk reduces the cost of putting decision-makers at risk, thus predicting a negative relationship between experience and risk-sharing compensation. I measure the organization's experience with risk as the ratio of years during which the organization has cared for patients under capitated contracts to the number of years the organization has been in existence. The square-root of this ratio was used in the analysis to normalize its distribution.

Finally, I control for the legal form of the organization, because certain legal forms themselves share risk across the organization. Sole proprietorships and partnerships share risk across individual professionals, and should thus be negatively associated with risk-sharing compensation arrangements, while professional corporations, partnerships of professional corporations, and associations do not share risk across professionals and should thus be positively related to risk-sharing compensation arrangements.

Model and estimation method

Given the categorical nature of the dependent variable, risk-sharing compensation, and the categorical and continuous nature of the independent variables, I examine the hypothesized relationship between organizational risk and the level of risk-sharing in physicians' compensation contracts through a multinomial logistic estimation of the

following regression equation: [14]

PERCENTAGE OF RISK-SHARING COMPENSATION = a +
b1 ORGANIZATIONAL RISK + b2 LN(ORGANIZATION SIZE) +
b3 ORGANIZATION SCOPE + b4 GROUP/IPA +
b5 AVERAGE MD TENURE + b6 FOR-PROFIT ORGANIZATION +
b7 LN(ORGANIZATION AGE) + b8 ORGANIZATION MDs OVER 45 +
b9 SQRT(RISK EXPERIENCE) + b10 LEGAL FORM

Agency theory predicts positive coefficients on organizational risk, average tenure of physicians, for-profit organization, organization age and legal form, while predicting negative coefficients on size, scope, form, the age of physicians, and risk experience.

RESULTS

I present results for Hypothesis 1 in Table 4.3. The overall model (Models 1, 2, and 3 combined) is statistically significant, suggesting that the independent variables are associated with the dependent variable, risk-sharing compensation.

Interpreting the results of the multinomial logistic model

Multinomial logistic regression estimates model parameters using the maximum-likelihood method. The estimated coefficients are thus those that make the observed results most likely. With three possible values of the dependent variable, risk-sharing compensation, (0%, between 0 and 100%, and 100%), the model produces coefficients comparing the likelihood of observing one value of the dependent variable versus another value of the dependent variable. Model 1 in Table 4.3 provides coefficients suggesting the

[14] Multinomial logistic regression assumes a multinomial distribution and thus accommodates categorical dependent variables with more than two categories and both categorical and continuous independent variables. Simple logistic regression assumes a binomial distribution, and thus accommodates only models with dichotomous dependent variables. Loglinear models accommodate polychotomous dependent variables but assume a Poisson distribution which does not appear appropriate for the dependent variable

TABLE 4.3: MULTINOMIAL LOGISTIC REGRESSION MODELS OF THE RELATIONSHIP BETWEEN ORGANIZATIONAL RISK AND RISK-SHARING COMPENSATION

Dependent Variable:	Model 1 *All* vs. *no* *RISK-SHARING* *COMPENSATION*	Model 2 *Some* vs. *no* *RISK-SHARING* *COMPENSATION*	Model 3 *All* vs. *Some* *RISK-SHARING* *COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors			
INTERCEPT	2.947	2.616	.331
	[19.048]	[13.667]	[1.392]
	(2.014)	(1.930)	(1.407)
PERCENTAGE OF	-.514	-1.126	.611
CAPITATED	[-.598]	[-.324]	[1.842]
PATIENTS	(.795)	(.779)	(.545)
ORGANIZATION	-.315	.013	-.329*
SIZE	[-.730]	[1.014]	[-.720]
	(.237)	(.202)	(.180)
SINGLE/MULTI-	1.116	.700	.416
SPECIALTY (0,1)	[3.053]	[2.014]	[1.516]
	(.826)	(.743)	(.557)
MEDICAL	-1.422	.245	-1.667*
GROUP/IPA (0,1)	[.241]	[1.277]	[-.189]
	(1.147)	(.947)	(.893)
AVERAGE MD	.025	.000	.024
TENURE	[1.025]	[1.00]	[1.024]
	(.054)	(.053)	(.037)
NOT/FOR-PROFIT	-.328	.400	-.728
(0,1)	[.721]	[1.492]	[-.483]
	(.945)	(.953)	(.727)
ORGANIZATION	.078	-.131	.209
AGE	[1.081]	[.877]	[1.232]
	(.322)	(.314)	(.220)
CAPITATION	-.209	.299	-.508**
EXPERIENCE	[.811]	[1.348]	[-.602]
	(.320)	(.306)	(.234)
X^2 *(df=16)*	31.428**	31.428**	31.428**

Coefficients: *p<.10; **p<.05; Coefficient antilogs in brackets; Standard errors in parentheses. N=159.

examined here. On limited dependent variables, see Agresti, 1990; Aldrich & Nelson, 1984; Maddala, 1983.

likelihood of observing 100% risk-sharing compensation versus 0% risk-sharing compensation. Model 2's coefficients suggest the likelihood of observing between 0% and 100% risk-sharing compensation versus observing 0% risk-sharing compensation. Model 3 offers coefficients suggesting the likelihood of observing 100% risk-sharing compensation versus observing risk-sharing compensation less than 100% but greater than 0%. Multinomial logistic regression estimates coefficients in log-odd units, and the significance of these coefficients is obtained through use of a Wald statistic (the square of the z test statistic, which divides B by its standard error) which has a X^2 distribution. The signs on these log-odd coefficients are indicative of the relationship between the independent and dependent variables: a positive coefficient suggests that the odds of risk-sharing compensation are higher the larger the independent variable. The coefficients' antilogs, odds, provide a more accessible measure of the scale of those relationships: a coefficient of -1.67 (the coefficient on monitoring as an alternative to incentives in Model 3) suggests that IPAs are .19 times less likely to use risk-sharing compensation, controlling for all the other variables in the model.

Description of results in relation to hypotheses

Model 3 is the only model in which any of the explanatory variables have a statistically significant association with the level of risk-sharing compensation. Hypothesis 1's key explanatory variable, organizational risk, does not have a statistically significant association with the dependent variable in any of the models, however. Instead, the negative association between Hypothesis 2's key explanatory variable, organization size, and the level of risk-sharing compensation obtains modest statistical significance (p=.068),

suggesting a strong trend in the direction predicted by Hypothesis 2. IPA organization also has a modestly significant, negative association with the level of risk-sharing compensation (p=.062), as predicted by agency theory. Capitation experience has the negative and statistically significant association with the level of risk-sharing compensation predicted by agency theory (p=.030). Single- or multi-specialty organization, average physician tenure, for-profit organization and organization age do not have statistically significant associations with the level of risk-sharing compensation in any of the models. The models presented do not include the additional variables of the percentage of physicians over 45 and legal form as the analyses which included these two variables did not fit the data as well as the one presented. The results presented are robust to the inclusion of alternative measures of each of the variables (continuous and dichotomous transformations) and to the inclusion and exclusion of those variables.

Finally, the results are also robust to analyzing the model as a simple logistic regression, in which the dependent variable is dichotomous: 0 indicating the use of *some* risk-sharing compensation (meaning that part of physicians' compensation shared risk, while some portion did not), and 1 indicating the use of *all* risk-sharing compensation (meaning that all of the physicians' compensation shared risk) (see Table 4.4). Organizations reporting that they did not use any of risk-sharing compensation were not included in the logistic analysis, given the dichotomous nature of the dependent variable (hence N=138). The comparison made by the simple logistic model partially mirrors the comparison made by multinomial logistic Model 3. Organization size obtains modest statistical significance (p=.082), although neither medical group vs. IPA organization or

capitation experience was significantly associated with the level of risk-sharing compensation, as they were in the multinomial logistic model (compare Tables 4.3 and

TABLE 4.4: LOGISTIC REGRESSION MODEL OF THE RELATIONSHIP BETWEEN RISK-SHARING COMPENSATION AND RISK

Dependent Variable Comparison:	All *vs.* some *RISK-SHARING COMPENSATION*
Regression Coefficients, Regression Coefficient Antilogs, and Standard Errors	
INTERCEPT	1.518
	[4.563]
	(1.043)
PERCENTAGE OF CAPITATED PATIENTS	-.007
	[-.993]
	(.009)
ORGANIZATION SIZE	-.319*
	[-.727]
	(.184)
SINGLE/MULTI-SPECIALTY (0,1)	.181
	[1.198]
	(.551)
MEDICAL GROUP/IPA (0,1)	-1.315
	[-.268]
	(.883)
AVERAGE MD TENURE	.015
	[1.015]
	(.037)
NOT/FOR-PROFIT (0,1)	-.945
	[-.389]
	(.778)
ORGANIZATION AGE	.161
	[1.175]
	(.211)
CAPITATION EXPERIENCE	-.174
	[-.840]
	(.224)
X^2 *(df=8)*	25.658***

Coefficients: *$p<.10$; **$p<.05$; ***$p<.01$; Coefficient antilogs in brackets. Standard errors in parentheses. N=138.

4.4). The simple logistic model, however, emphasizes the particular import of multinomial logistic Model 3: only Model 3 focuses on the two categories of *positive* risk-sharing compensation (*some* or *all* risk-sharing compensation). Multinomial logistic Models 1 and 2 compare each of these positive categories to the third category, no risk-sharing compensation. Thus, while limited to the logistic model and multinomial logistic Model 3, and only of modest statistical significance, an association in the predicted direction between organizational size and risk-sharing compensation is found when the *key* comparison is made.

DISCUSSION

The results do not offer support for Hypothesis 1, and suggest little relationship between the level of organizational risk and the level of risk-sharing among individual professionals within the organization. Instead, the results trend toward confirming Hypothesis 2's prediction that organizational size will be negatively associated with risk-sharing. The results also suggest the importance of organizational form and experience with organizational risk in the design of risk-sharing arrangements. The relationship between these factors and the level of risk-sharing compensation consistently support agency theory's understanding of organizational governance.

These results are similar to those of Kralewski et al.'s (1996), in which researchers found no relationship between the level of organizational risk (the proportion of organizational revenue derived from capitation) and physician payment methods (categorized as salary or fee-for-service) but did find organizational size to be significantly associated with the level of risk-sharing in physician compensation arrangements. My

results are also consistent with Gaynor & Gertler's (1995) results, in which organizations with higher levels of risk-sharing limited the size of the organization. My, Kralewski's, and Gaynor & Gertler's results contradict those of Lang & Gordon (1995), however, who found that organizational size was positively related to risk-sharing. All four studies, however, point to the importance of organizational size in the design of risk-sharing compensation arrangements. Lang & Gordon (1995)'s anomalous results may be the result of their emphasis only on the effects of size on the *benefits* of risk-sharing, while my, Kralewski et al.'s (1996), and Gaynor & Gertler's (1995) results additionally include the effects of size on the *costs* of risk-sharing.

Lang & Gordon's (1995) contradictory result may also be attributable to an additional variable not included in either my or their model. Gaynor & Gertler (1996) include a behavioral variable in their model of medical group organizations: the risk aversion of the organization's physicians. Increased average risk aversion among physicians in the medical groups Gaynor & Gertler examine leads these organizations to choose risk-sharing compensation arrangements and to limit the size of the organization. Perhaps Lang & Gordon's lawyers were less risk-averse than Gaynor & Gertler's physicians, or they dealt with that risk-aversion differently.

Emphasis on individual, behavioral components like risk aversion might add to agency theory's description of organizational governance arrangements. The results above offer support for the importance of at least two other behaviorally-based variables: medical group vs. IPA organization and capitation experience. Agency theory's predictions about the relationship between organizational form and risk-sharing reflects an

understanding that some forms of organization (here, IPAs) make it harder for organizational participants to monitor each other. Predictions about the relationship between capitation experience and risk-sharing, resting on assumptions about the effects of becoming accustomed to innovations over time, similarly suggest that the individual behavioral level of analysis is key to agency theory's ability to explain organizational governance arrangements. Longitudinal analyses would aid in the development of this behavioral component, perhaps providing evidence of adaptation and learning.

Additionally, while I do not include an explicit measure of risk aversion in my analysis, in addition to indicating the greater difficulty of monitoring associated with IPA organization, the statistically significant, negative effect of IPA organization on risk-sharing in my results may suggest the importance of risk-aversion on the part of individual physicians. IPAs are commonly considered the organizational form of choice among physicians who do not wish to sacrifice the autonomy of individual practice for the benefits of the greater negotiating power of a larger organization. IPAs provide this greater negotiating power without sacrificing autonomy—and without sharing risk across physicians. IPA physicians might thus be expected to be less risk averse than physicians who are members of traditional medical group practices, which sacrifice autonomy and share risk. The incorporation of other individual level characteristics might improve the explanatory power of empirical agency models of organization more generally.

Finally, while the analysis presented here does not report on risk-sharing's effect on behavior, these effects are of particular concern in the provision of health care. Gaynor & Gertler (1996) assume that physician organizations share the risk of capitation across

physicians in the organization, and through simulation, suggest the unintuitive result that capitation may in fact reduce physician effort. My analysis instead suggests that large physician organizations tend not to share risk across physicians, regardless of the proportion of their revenues that come from capitation. As physician organizations increase in size, as they have been (Emmons & Kletke, *forthcoming;* American Medical Association, 1997; Kletke, Emmons, & Gillis, 1996), the prevalence of risk-sharing, and hence potential shirking, may fall—rather than increase, as Gaynor & Gertler suggest.

Further investigation of the relationship between capitation at the medical group level and compensation at the individual physician level might alleviate apprehension about the increasing predominance of capitated contracts (Salmon, White & Feinglass, 1990; Woolhandler & Himmelstein, 1995). The current study suggests that medical groups may insulate their physicians from capitation's incentives: while capitation at the individual level is one of the non risk-sharing compensation devices used by large medical groups, these medical groups also reported accepting capitation at the organizational level while compensating their physicians through other, non-risk-sharing means: primarily discounted fee-for-service and on the basis of individual productivity (measured by charges or receipts). Although perhaps easing some fears, these results question the industry's progress toward a valued goal, for the promise of managed care cannot be realized until contracts that shift risk to medical groups are met by medical groups structured to provide cost-effective, quality care. Organizations' needs for consistency between external and internal incentives, in health care provision and more generally, remains an area in need of further research.

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